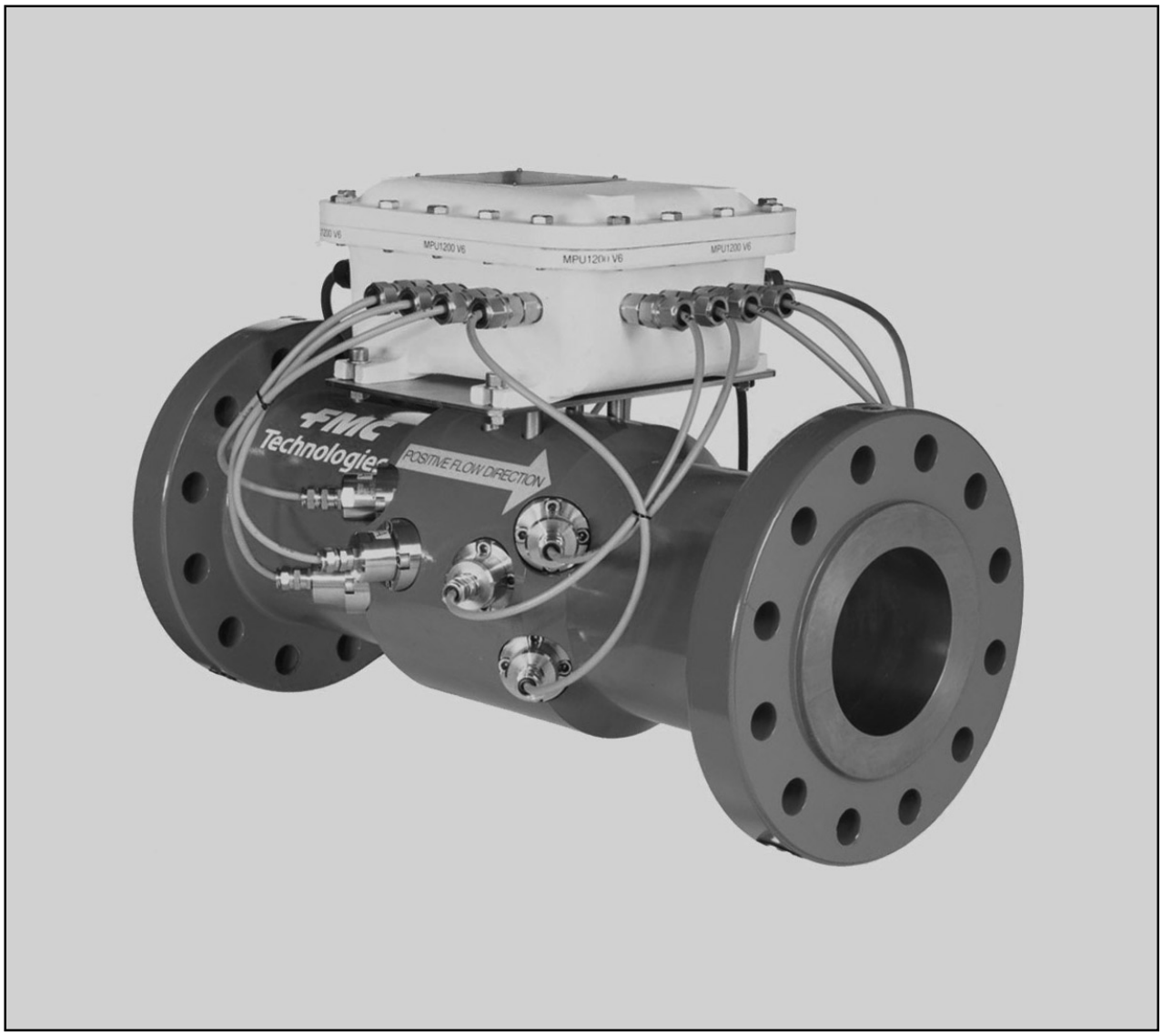

MPU1200 V6
MPU1200 V6
MPU1200 V6
FMC Technologies
POSITIVE FLOW DIRECTION

History

Revision	Date	Editor	ECN	Status	Description
Rev. 01	11.12.2007	xx	---	released	Take over from KOS SAP System
Rev. 00A	**April 2008**	NB	20207	released	New Logo

Important

All information and technical specifications in this documentation have been carefully checked and compiled by the author. However, we cannot completely exclude the possibility of errors. **Smith Meter GmbH** is always grateful to be informed of any errors.

TABLE OF CONTENTS

1. INTRODUCTION

This manual describes the operation of the Winscreen operator's interface and diagnostics software tool for ultrasonic meters from FMC Measurement solutions. The program is compatible with these meters:

- Smith Meter™ Ultra[6] (6 path ultrasonic meter for liquids.)
- MPU 1200 (6 path ultrasonic meter for gas.)
- MPU 600 (3 path ultrasonic meter for gas.)
- MPU 200 (1 path ultrasonic meter for gas.)

General information regarding installation, operation and maintenance of the ultrasonic flow meters are described in:

- Ultra[6] User Manual for the liquid meter and
- MPU Series B User Manual (USM-0000020225) for all different gas meters

We reserve the right to make changes to the construction and/or configuration at any time, this manual is based on the latest information, and may be subject to changes.

1.1. Copyright

1.2. Trademarks

Products listed are trademarks of their respective manufacturers. Company names listed are trade names of their respective companies.

1.3. Abbreviations

Abbreviation	Description
DSP	Digital Signal Processor
HW	Hardware
I/O	Input / Output
Kb	Kilo byte
LAN	Local Area Network
Mb	Mega byte
MPU	Multi Path Ultrasonic
PC	Personal Computer
Rx	Receive
SW	Software
Tx	Transmit
VOS	Velocity Of Sound

1.4. Guarantee

FMC Technologies Inc. and its subsidiaries assume no responsibility for any errors that may appear in the publication, or for damages arising from the information in it. No information in this publication should be regarded as a warranty made by FMC Technologies Inc. The information in this publication may be updated without notice.

The guarantee terms are stipulated in the delivery conditions.

The guarantee on the equipment expires if:

- Equipment is damaged during transport, handling, storage or installation where instructions are not followed or due to carelessness.
- Service, operation and maintenance are not carried out strictly in accordance with the instructions.
- Repairs are not carried out by our personnel, or if they are carried out by your staff without our prior written permission and strictly in accordance with the instructions.
- Changes are made to the equipment without our prior written permission.
- Original parts are not used.
- Equipment is used improperly, incorrectly, carelessly or not in line with its nature and/or purpose.

1.5. Equipment Required

A personal computer with certain hardware components and configuration of software and communication protocols is needed to establish connection to the ultrasonic flow meter.

Minimum requirements:

- Microsoft Windows 98SE, NT, 2000, XP or Vista operating system
- Pentium 133 with 32Mbyte RAM.
- Serial or Ethernet interface

Recommended:

- Microsoft Windows 2000, XP or Vista operating system
- Pentium 3 or equivalent or newer with 512 Mbyte RAM
- Ethernet Interface

2. PRE-OPERATION

Before you can start the operation of the Winscreen program, the program must be installed.

2.1. Install Winscreen Software

A. Insert the installation floppy disc or CD-ROM in the PC or locate the Winscreen installer (Winscreen.msi).

B. Double-click the Winscreen installer.

C. Follow the on-screen instructions.

2.2. Uninstall Winscreen Software

A. Go to Start, Settings, Control Panels, Add/Remove Programs
B. Find Winscreen in the program list. Click the Remove button.
C. Follow the on-screen instructions.

2.3. Set the IP address on the PC (Ethernet only)

To communicate with the meter, the IP address of the meter must be reachable from the PC (on the same subnet). This rule applies to any networked unit. The IP address of the PC can be checked by running “IPCONFIG” in a DOS box. If the PC and the meter are on different subnet, one of them needs to change the IP address. If the meter is not connected on a network with a DHCP server, you can change the IP address of the PC. If you are on a network with a DHCP server, extreme care should be taken so that you do not select the same IP address as another unit on the network. Please contact your network administrator in any cases if in doubt.

To change the IP address of your PC:

A. From the Star menu in Windows, select **Settings – Network and Dial-up Settings – Local Area Connection**.

B. Select **TCP/IP protocol - Properties**.

C. Set a fixed IP address (**Specify IP address**) and set an address in the same group as the flow meters (but not the same), for example 128.1.200.100. (Meter address in this example is 128.1.200.54).

D. Set subnet mask 255.255.255.0. The first three digits, in the IP address must the be equal for the PC to reach the meter

NOTE: Each IP address must be unique, i.e. no units connected to the same network can have the same IP-address.

3. START WINSCREEN PROGRAM

To start the Winscreen program, double-click on the program icon that appears after the installation on the desktop, or use the start menu.

Winscreen has three security levels, shown in the table below.

Password	Level
Low	Low (Customers, changes not possible)
High	High (Customers, changes possible)
####	Super-user (FMC Service engineers)

Clicking “Cancel” will result in Security Level Low.
Down in the right corner of the program the selected security level is shown.

Security level “High” give access to more advanced diagnostic tools and the ability to make changes to the meter database.

3.1. Connecting to the Ultrasonic Meter

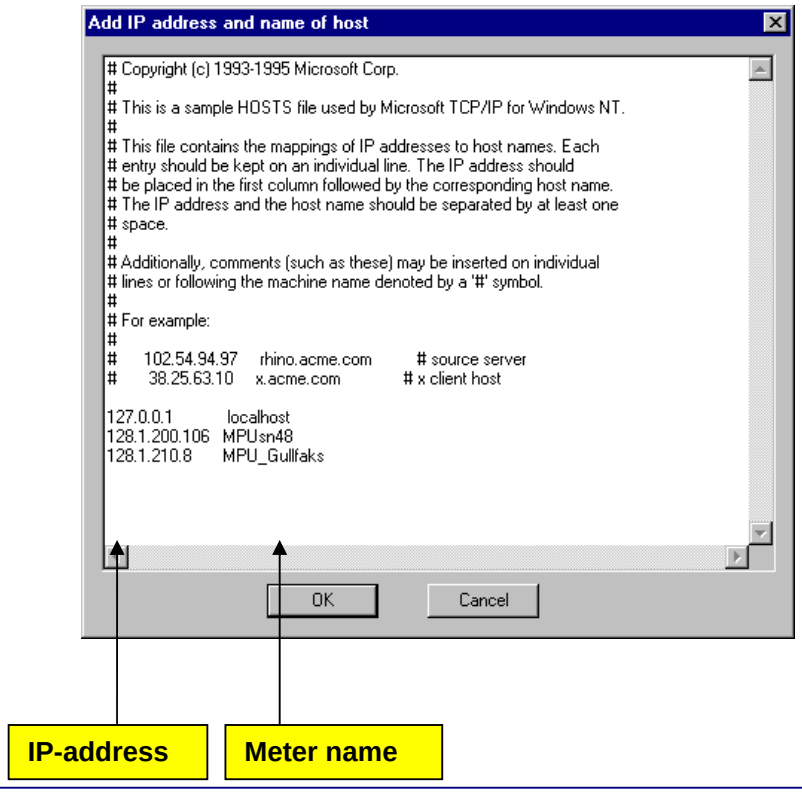
3.1.1. First time communication setup

Each meter on the network will have a unique IP-address. The IP-address and name of the meter can be defined in the Host-file on the PC to simplify access.

For editing the Host file, do the following steps:

A. Click on the soft key “Define a new target” in the picture shown below.

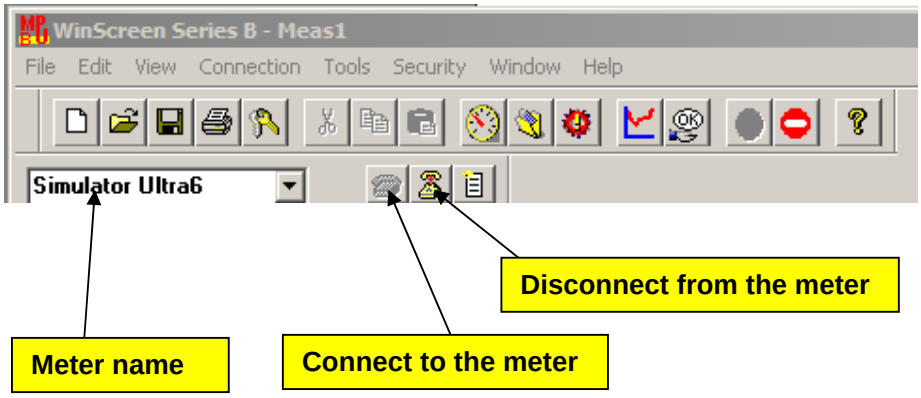
B. Then the Host file appears and can be updated with correct IP-address and name of the meter.
Note: Use the space key, not the TAB-key for spacing.



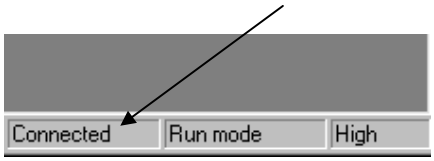
3.1.2. Establish communication with Ethernet link

This section describes how to establish data communication with an Ethernet physical connection (twisted pair cable or fiber-optic cable) between the flow meter and the PC.

The given meter host name (as specified in the Host file) or IP address must be written into the picture shown below, or picked from the pull-down menu. This is necessary for the Winscreen program to communicate with the meter. Click the connect button as shown below to connect to the meter.



A field in the bottom of the Winscreen program shows if the meter is connected or not.



3.1.3. Establish communication with serial link

This section describes how to establish data communication with a serial connection (RS-485/422/232) between the flow meter and the PC.

The WinScreen program can be run using serial communication with one single meter or a multidrop network with multiple meters. The meter is designed to communicate through both Ethernet and serially via Modbus. The PC has RS232 interface, meaning if RS485 or RS422 is used due to long cable lengths, a converter to RS232 is required.

A. Connect a 9-pin serial cable to the PC's serial port (usually COM1)
B. Connect cable to the meter's serial port. Refer to the wiring diagram in the User's Manual.
C. Start Winscreen. Select COM1 from the pull-down menu.
D. Click the "Connect to meter" soft key.

3.2. Run Winscreen against PC Simulator

For demonstration or training purposes, the Winscreen program can run a meter simulator included in the application. Select "Simulator Ultra6", "Simulator MPU1200", "Simulator MPU600" or "Simulator MPU200" in the "Meter name" field as shown above, and click on the "Connect"-button. If the "Measured values" window is opened, the measurement data can be inspected as if the Winscreen program was connected to a real meter with flow. Each piece of data can be manipulated under the Manual Values tab of the Database Configuration screen.

To simulate flow select from the main menu:
Tools – Simulator – Simulate Transit times. (See chapter 6 for more detail on simulation.)

3.3. Trouble Shooting – Ethernet

If no contact to the meter is obtained:

- Check that the power on the meter is switched on.
- Check that the IP address of the meter is correct.
- Check that the subnet mask and IP address of the PC comply.
- Make sure that communication cables are connected.
- Try to ping the meter. Type “ping” + applicable IP address in a DOS window.
- If reply:
  - Check Host file.
  - It is also possible to use the IP address directly instead of the host name to avoid problems with Windows host file.
- If not reply:
  - Check communication cables.
  - Check that the link led on the PC and on the UDSP board is lit.
- Note: Changing a PC’s IP address some times requires resetting the PC for the changes to take effect.

4. OPERATING THE WINSCREEN PROGRAM

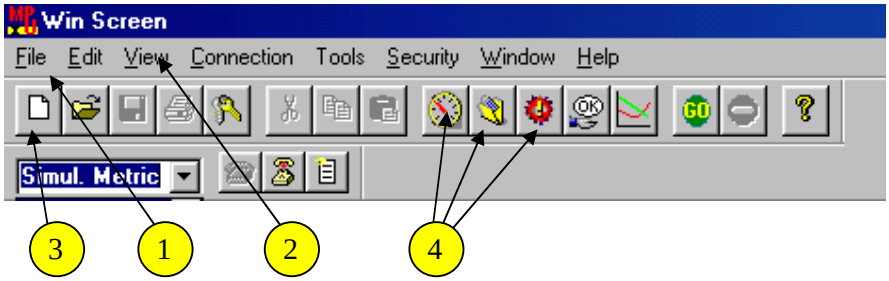
4.1. Menu Overview

The Winscreen software contains ten functions.

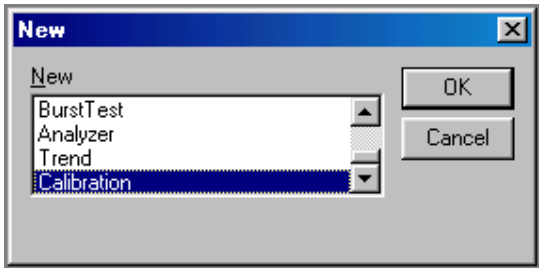
1. Measured values
2. Database Configuration
3. Alarm Logs
4. Database Report
5. Trend Log
6. Analyzer
7. AGA-10
8. Parameters (Service personnel only)
9. Diagnostics (Service personnel only)
10. Calibration (Service personnel only)

The last three functions are diagnostic tools. All functions are accessible from more than one place in the application. These are shown in the picture below.

1. File Menu under New
2. View Menu
3. New in the toolbar
4. Directly in the toolbar



The New Menu option will be used in the following sections. These applications are available by clicking OK when the desired option is selected.

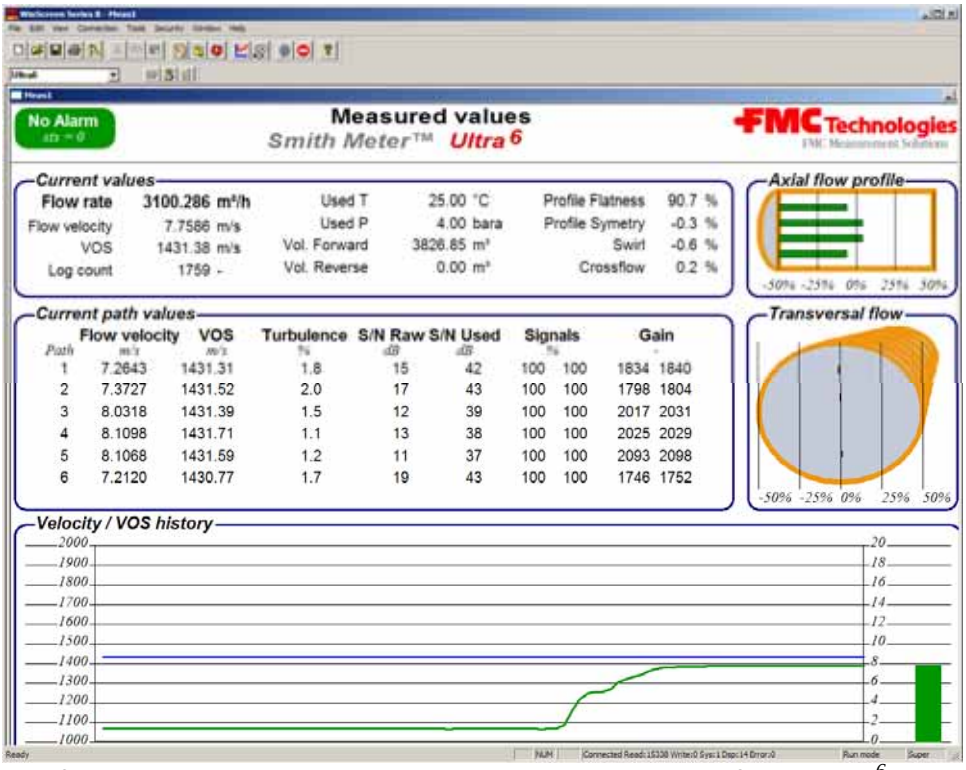


4.2. Measured Values

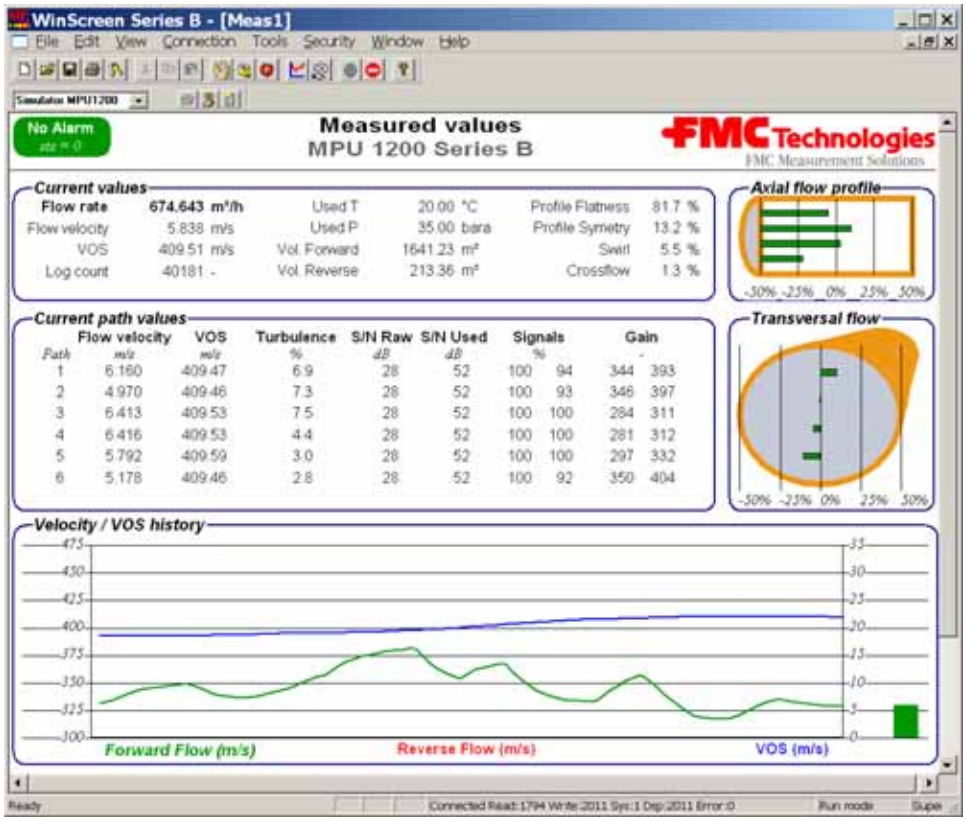
The measured values window will automatically be shown when connecting to a meter.


Soft key

This window can also be opened by pressing this button in the toolbar.



The figure above is showing a typical measurement window for an Ultra[6] liquid flow meter, and there is positive flow with a well developed flow profile.



The figure above is showing a typical measurement window for a MPU 1200 gas flow meter The flow profile is asymmetric and with strong swirl.

This Measured Values picture contains a summary of important information, below is a short explanation. Units can be Metric or Imperial.

4.2.1. Alarm indicator (top left)

- Alarm Status Word, Coded number indicates type of error.
- Green color – no alarm, Red color – active alarm.

Press the red alarm button to see alarm details.

4.2.2. Current Values

- Flow rate - Total calculated volume flow rate.
- Flow velocity - Showing the weighed average flow velocity for all paths. Used to calculate actual volume flow rate.
- VOS (velocity of sound) - The average Velocity of Sound for all paths.
- Log count indicating how many measurement cycles have passed since the meter was started.
- Used temperature and pressure –What is in calculation. Geomity correction and transducer calibration selection.
- Total accumulated volumes – Forward and reverse.
- Profile flatness – 100% means a totally flat profile. Outer / Inner * 100.
- Profile Symetry – 0% is perferct symmetry. Positive number means more flow in the top.
- Swirl and cross flow

4.2.3. Current Path Values

- Flow velocity - The variation between the paths should be according to expected flow profile. For a well developed flow profile the flow velocity for center paths should be higher than the flow velocity for outer paths.
- VOS - The variation between the paths should not exceed 1 m/s (~3 ft/s)
- Turbulence – The amount of scatter on the path velocities (Standard deviation in %)
- S/N Raw and S/N Used. The amount of noise on the sampled signal and after signal processing.
- Signals - Number of signals (in percent) used to calculate the path velocity is usually above 90%, may be lower at high velocity. If the value is below 30%, special attention is needed to check that flow velocities and velocity of sound measurements for each path are correct.
- Gain - This shows the receiver gain for each transducer. The gain is a number in the range 0 – 2600. The gain is adjusted automatically to achieve required signal amplitude. The value is dependent on meter size, operational pressure and flow velocity. Typically in the range 300 – 1500. Individual variations due to different path lengths and turbulence levels are expected.

4.2.4. Axial Flow Profile

- Shows the axial flow components in each layer, resulting in the actual flow profile. Green bars indicate forward flow, red bars reverse flow. The numbers represent the percentage above or below the average total flow velocity.

4.2.5. Transversal Flow (only on 6 path meters)

- The Transverse Flow window indicates swirl or cross flow. The bars indicate the direction of the swirl and the numbers the magnitude of the swirl as a percentage of the average total flow velocity. For example, for 10 m/s total average flow velocity, a green bar at 25% represents a clockwise swirl with a velocity of 2.5 m/s.

4.2.6. Velocity / VOS History

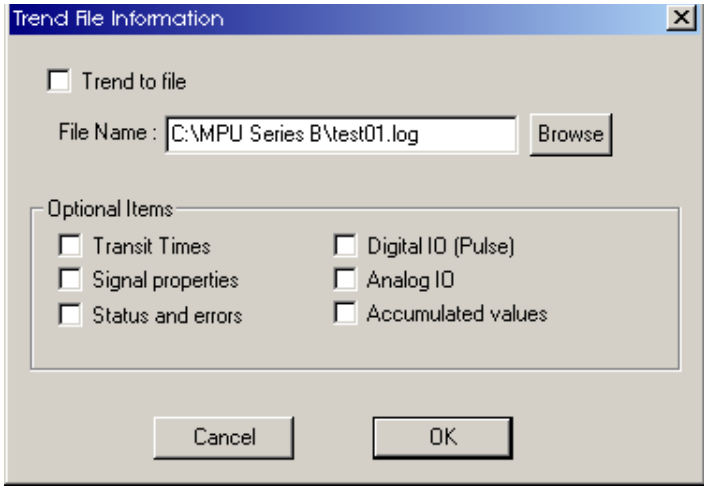
- Showing a Trend curve of Mean velocity and Mean VOS variations over the last period of time. A Green line indicates positive flow. A Red line indicates negative flow. The scale is to the right. The bar to the right (Green or Red respectively) shows the current actual Mean velocity.
- The Blue line indicates VOS. The scale is to the left.

4.3. Trend


Soft key

This window can also be opened by pressing this button in the toolbar.

To make a Trend log of the meter operation for a period of time, the Trend window in the New menu can be opened or by clicking on the Velocity/VOS trend window on the Measured Values Screen. This will bring up the Trend Configuration Dialog:



Clicking the Trend to file box and clicking OK will start and stop the log. Turning on each of the Optional Items boxes will add the following data to the log:

• Transit Times	• Raw Transit Times • Raw Transit Time Diff
• Signal Properties	• S/N levels • Uncorrected flow velocity • Uncorrected VOS • Velocity profile factor • Velocity profile limit • VOS profile limit
• Status and Errors	• Alarm Status • Currently used calibration node • Profile Learner State • Travel time correction count • Too low flow Alarm • Too high flow Alarm

	• Electronics failure Alarm • Transducer Failure Alarm • Calculation error Alarm • Burst % low Alarm • Gain High Alarm • Gain deviation Alarm • VOS Difference Alarm • Path substitution indication Alarm
• Digital I/O (Pulse)	• Pulse out requested frequency • Pulse out total count forward • Pulse out total count reverse • Pulse out status
• Analog I/O	• Slot 1 Count value • Slot 2 Count value • Analog Temperature input • Analog Pressure input
• Accumulated Values	• Accumulated Volume Forward • Accumulated Volume Reverse • Accumulated Error Volume Forward • Accumulated Error Volume Reverse • Accumulated Time

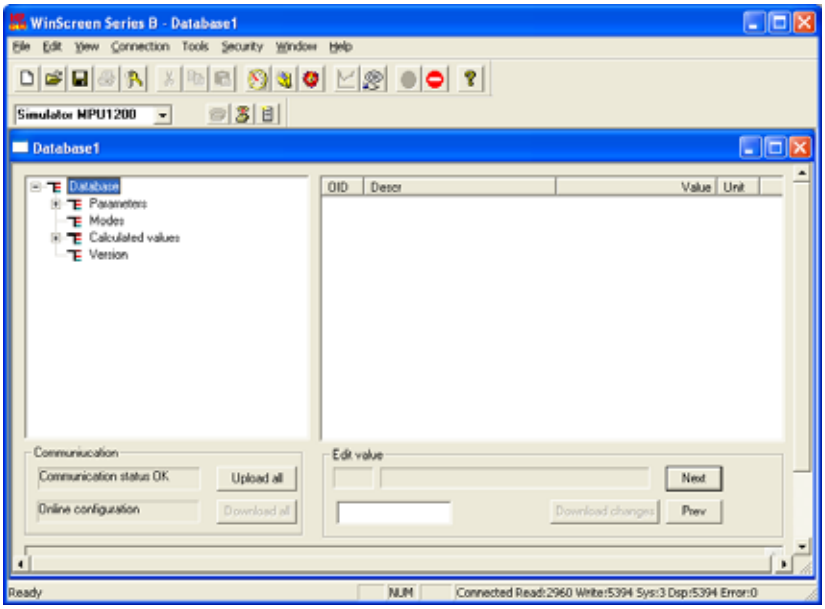
The output of the Trend log is a tab-delimited text file that can be viewed and manipulated using Excel.

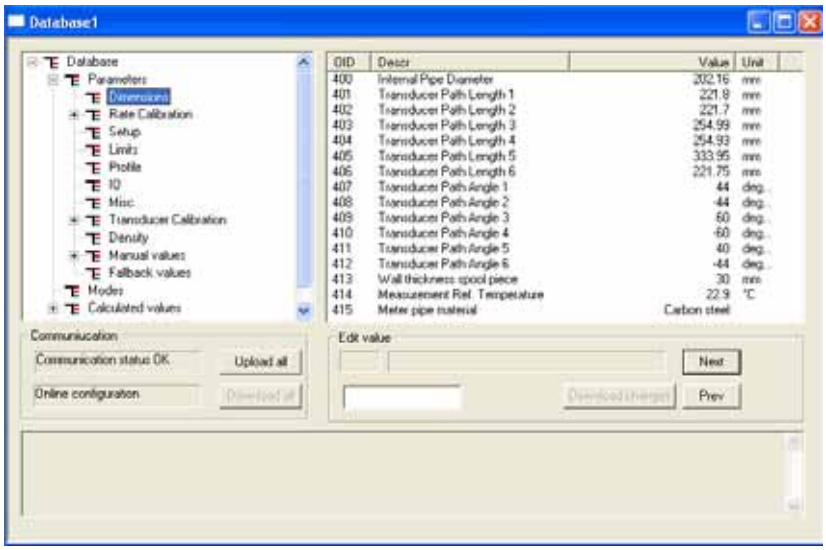
4.4. Database Configuration


Soft key

This window can be opened by pressing this button in the toolbar.

The first picture below shows the first window that appears after selecting Database Configuration in the New menu. To go further into the database, just click on the plus sign in front of the desired choice. This is shown in the second picture below.





4.4.1. Contents in the Database Configuration window

It is divided into three main groups - Parameters, Modes and Calculated Values. The main groups may have more levels of information. The main groups are shown below; more details are shown in Section 0.

Parameters

- Dimensions
- Rate Calibration
    - Ax+B
    - Multipoint curve
- Setup
- Limits
- Profile
- I/O
- Misc
- Zero Calibration: Node 1 to Node 3
- Density
- Manual Values
    - Measurements
    - Signal
- Fallback Values

Modes

Calculated Values

- Measurements
    - Path Velocities
    - Signal Measurements
    - Transit time Measurements
    - Standard Calculations
    - I/O values
    - Density
    - Accumulators
- Diagnostics
    - Errors
    - S/N Measurements
    - Time consumption
    - Profile
        - Corrections
    - Status

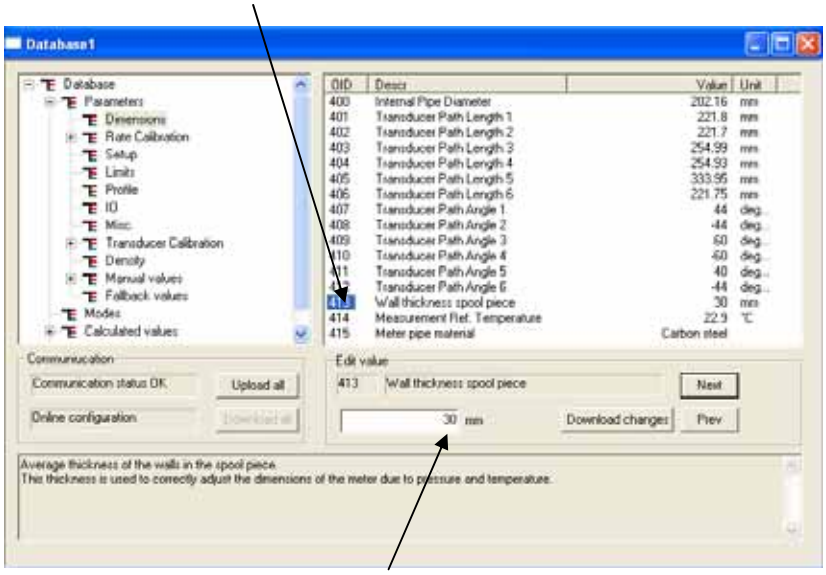
Version

4.5. Change parameters

Warning!!! Changing values of the parameters will in many cases influence the meter. Take care not to change values into wrong values. Check and double check all changes before downloading the changes.

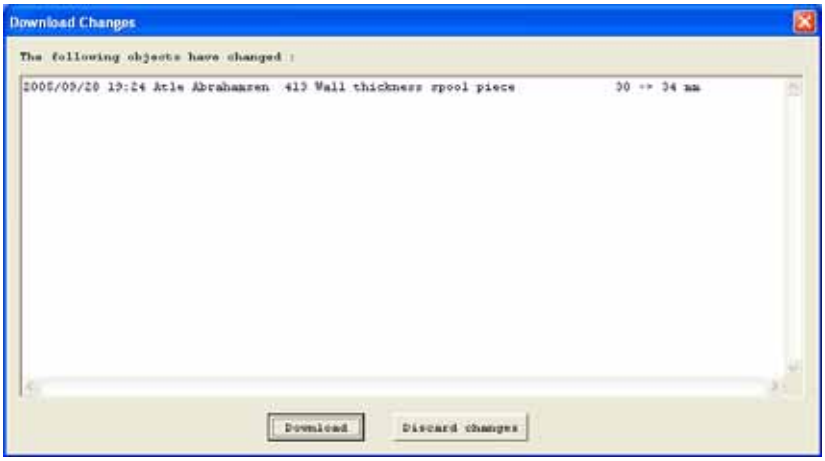
The correct security level must be entered to access this function. For meters delivered with a hardware lock, this must be removed.

- Select the parameter to be changed by clicking on the OID with the cursor. This parameter will now be shown in the Edit value area of the window; the present value and name appear. Also a help text is appearing in the bottom part of the window that is a short description of the usage of the object in the meter.



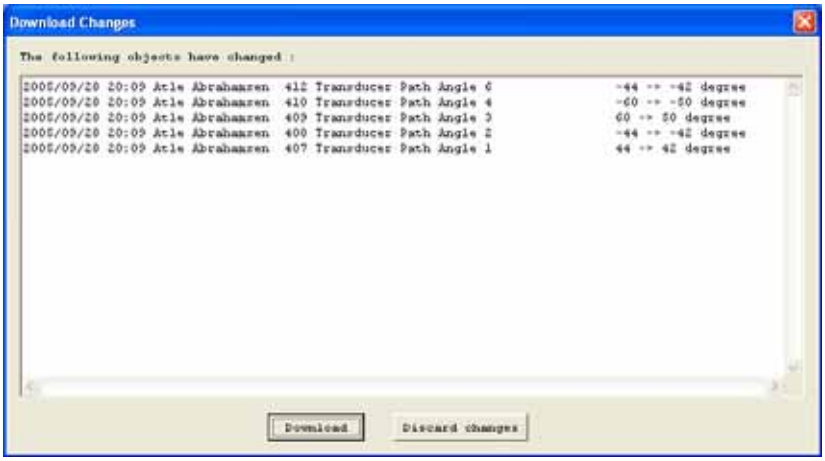
- Type in the new value

- The choice “Download changes” becomes available. Click on it and a new window will appear. This window is shown below.



This window shows the old and new values. The change can now be downloaded or discarded. This information will be stored in the Operator Change Log (See Section 4.6).

It is possible to change more than one value in one download operation. Click on the next parameter and then press the Download button after the last change.



4.6. Logs


Soft key

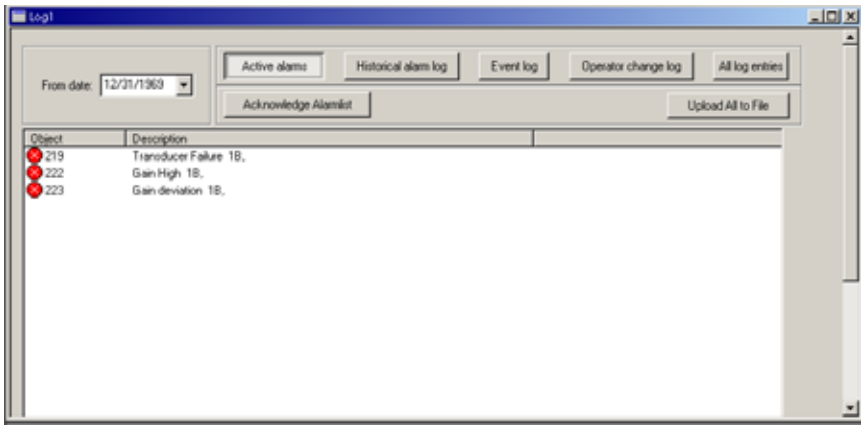
The various logs can be inspected by opening the Log window in the New menu (or the shown soft key).

As the picture below shows, there are four different logs - Active alarm log, Historical alarm log, Event log, and Operator change log. All these logs are configured the same way. All logs are stored in the same memory location, which can hold a total of 4096 log entries. A text file viewable in Excel can be sbvaved by clicking on the Upload all to File button.

4.6.1. Active alarm log

Alarm logs are divided into two levels; Active Alarm Log and Historical Alarm Log.

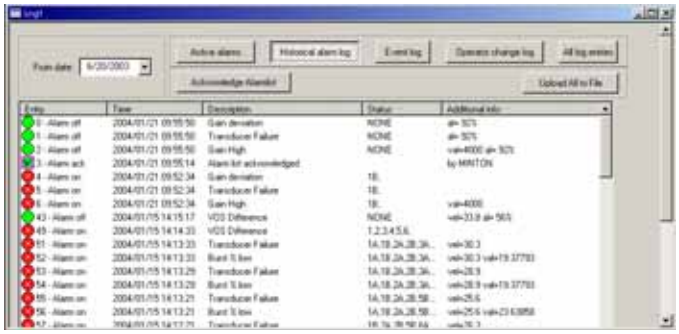
The Active Alarm log shows only the alarms that are active and not acknowledged. The alarm is acknowledged by clicking on the Acknowledge Alarm list.



The first column lists the Log Entry Number and a graphical description of the alarm. The second column gives the date and time the alarm occurred. The third column gives a description of the alarm, and the fourth column shows which specific path the alarm is affecting. The last column gives additional information about the alarm state, such as the value that triggered the alarm and the flow velocity at the time of the alarm.

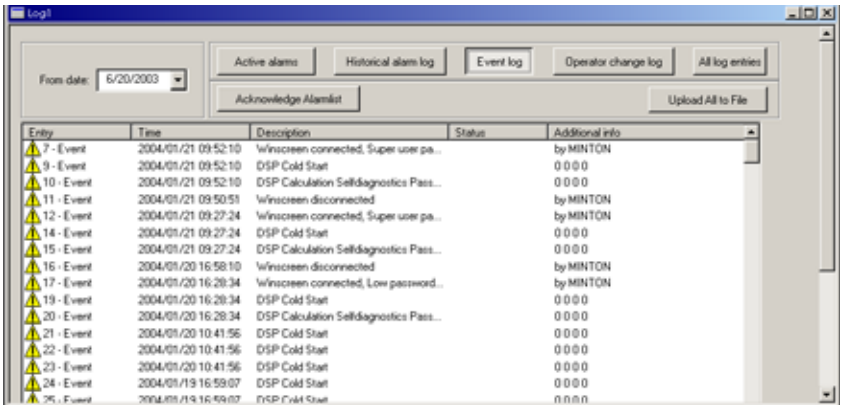
4.6.2. Historical alarm log

The Historical Alarm Log shows all alarms that have been raised, in addition to showing the alarm off state and any acknowledgements.



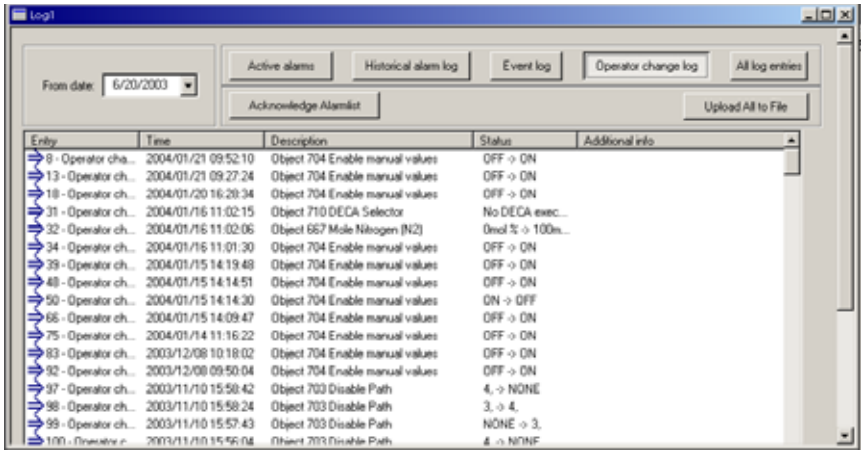
4.6.3. Event log

The Event Log shows meter start-ups, various software self-diagnostics, and logon's via Winscreen. A time stamp and a description accompany each entry. Winscreen logon's also show the name of the user that logged on.



4.6.4. Operator change log

Changes made to operation modes or parameters by the operator that may influence the flow measurement are recorded automatically. The screen shows the entry number, time stamp, a description of the value changed, and the before and after settings.

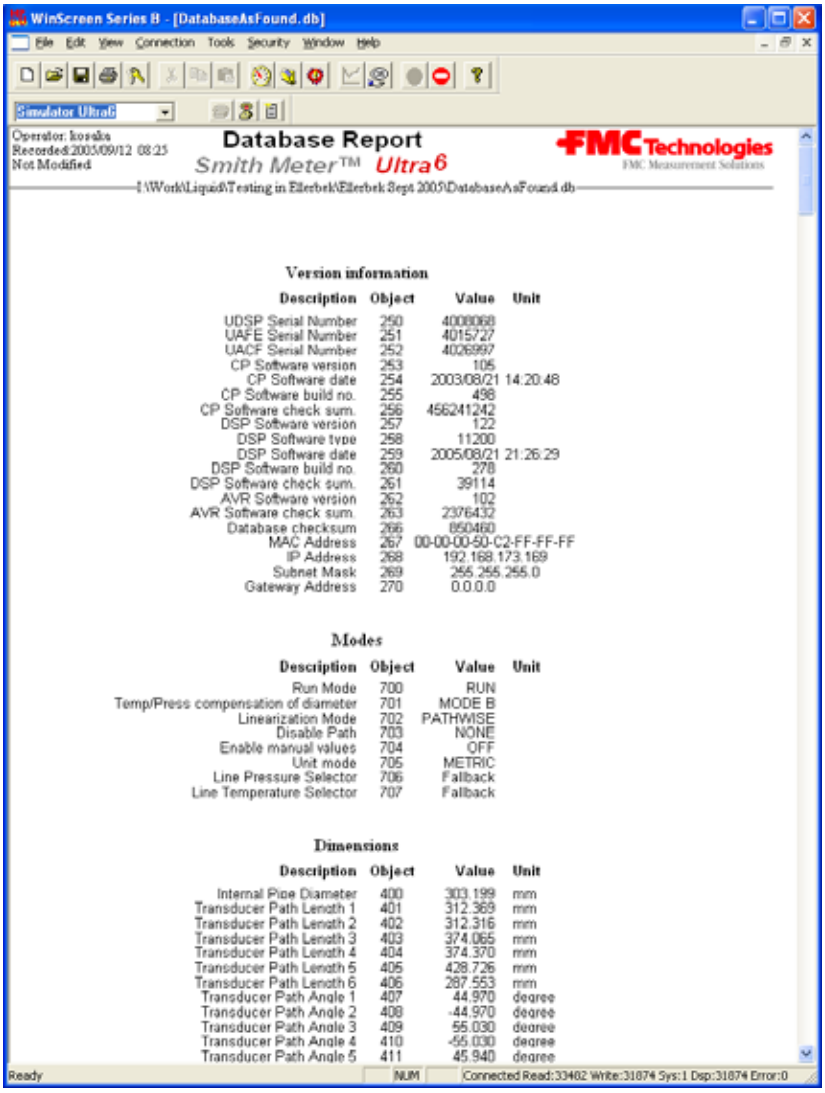


4.7. Database Report


Soft key

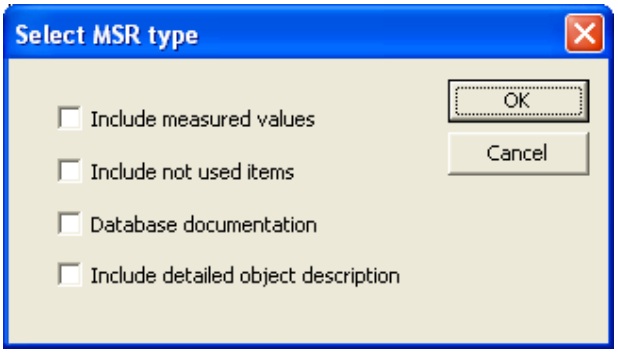
All the relevant data stored in the database can be uploaded by opening the Database Report window in the New menu (or the shown soft key). Database reports can then be printed or stored as a file.

The database report is a listing of the database. It uses the same file format as the database configuration window.



4.7.1. Select Report Format

The database can be presented in a few different formats. To select the format, click left mouse button anywhere in the window. This opens this dialog:



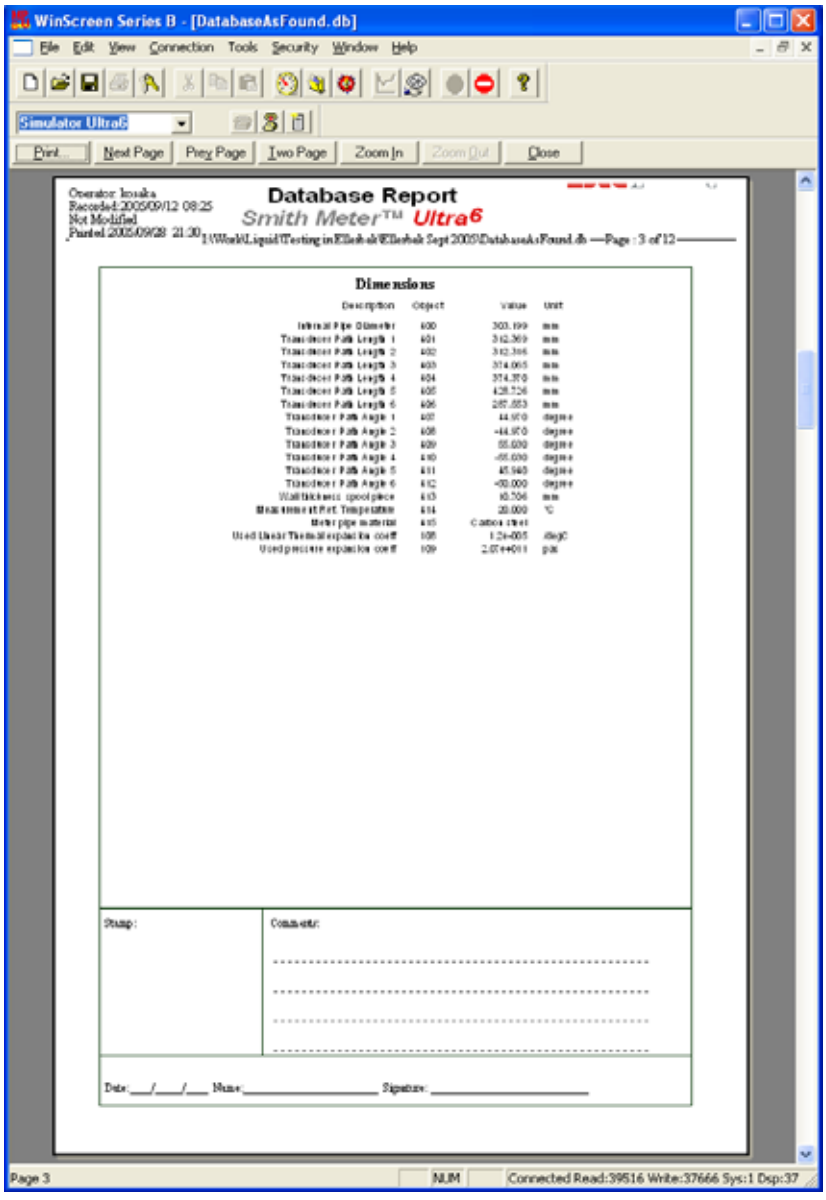
- If none of the check boxes are selected, the report will list parameters with values that are in use in the current database.
- If you check “Include measured values” the listing will add all measured values.
- If you check “Include not used items” the listing will include items even if they are not used.
- If you check “Database documentation”, this will make a different type of listing. No values will be included. This listing is useful as a listing of all objects with Modbus address in the meter.
- The last one “Include detailed object description” is intended to be used together with “Database documentation”. It makes the same type of listing, but includes detailed description about each object.

4.7.2. Print Database Report


Soft key

The Database Report can be printed out from the file menu in the program, or by using the soft key.

See example of a Database Report below.



In the top of this report there is information regarding who the operator is, time and date when the report was generated and if the report is modified or not. The text “Not Modified” will change to “Modified” if any changes are made to the database after being uploaded from the meter. This means that a “Not Modified” database report can be used as a documentation of the database content at a given moment.

4.7.3. Save Database Report

The report can also be stored as a file (filename.db). Use the **save** soft key or menu selection. The database report file can be opened later for inspection and printing.

4.7.4. Exporting Database Report

The report can also be generated as a “RTF” (Rich text format) file. This format is recognized by most office programs.
To generate the “RTF” file, select from the main menu:
File – Export ASCII file and then select the file name.

4.7.5. Open Database Report

The stored database report file (filename.db) can be opened by using the **open** soft key or menu selection. Both the “Database Configuration” – (type of window with tree-structure) and the “Database Report” will be opened, and the data can be inspected in both.

5. DIAGNOSTICS AND SERVICE

When the alarm or alarm log system indicates that something might be wrong with the meter, the Winscreen program can be used to help identifying the problem.
The Winscreen program contains various selections of diagnostics and service tools. Normally the alarm will give a hint about what kind of problem the meter is experiencing. In this chapter, a full diagnostic of the meter will be performed from signal to generated output to cover the range of diagnostic tools available in Winscreen.

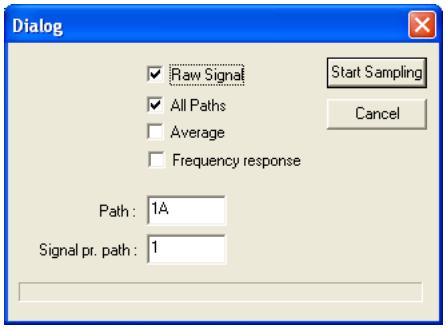
As a result of the diagnostics you should have a few files saved on your computer. These files describe the state of the meter:

1. Database file (.db)
2. Analyzer file (.sig)
3. Trend log file (.txt)
4. Uploaded logs

5.1. Analyzer – Transducer Signal Quality Check

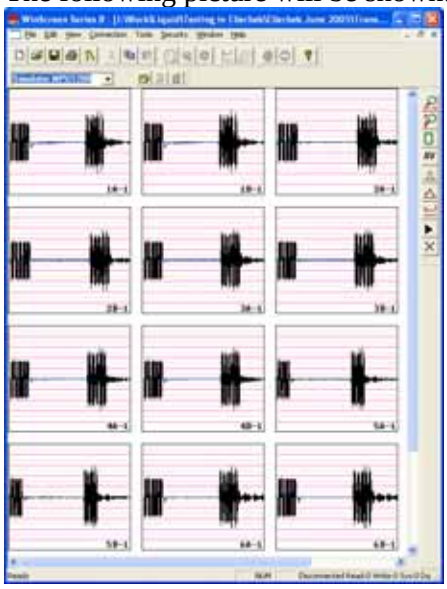
This feature contains valuable information on the signals generated by the meter. Actions have to be taken if irregularities in the **Raw** Signals are shown.

Click on New –> Analyzer. The following picture will appear:



A. Check “Raw signal” and “All paths” (default)
B. Click the **Start Sampling** button and a progress bar indicates the progression of the signal collection.

The following picture will be shown.



- The collected data can be stored as a file (filename.sig) by using the save button.
- Opening the file using the open button can inspect previously collected data.

The following toolbar will also appear. It is used to analyze the signal.

- Double-click on one of the signal recordings.
- **Zoom X** - To stretch X-axis
- **Zomm Y** - To stretch Y-axis
- **Window** – To focus on a specified part of the signal
- **Average** – Show an average of all the signal recordings (will reduce / remove signal noise)
- **Filter** – Applies a band pass filter to remove noise from the signal.
- **FFT** – Shows the frequency spectra of the signal
- **Play Sound** – The signal can be played (frequency divided)
- **X correlate** – Cross correlates the signal against the bypass signal.
- **DSP Func** – Applies typical DSP algoritms to the signal. (Service diagnostics).

Check list:

1. In the view where all signals are visible at the same time, check that all paths look approximately the same. Check that there is not extensive level of noise on any channels.
   - If a channel has weak or no signal (compared with the noise), check the transducer cables and connections of that specific transducer pair. Other possibilities are defect transducer or input channel at the UAFE board.
2. If a signal looks suspicious select the signal by double-clicking. Then zoom into the signal by using the toolbar button “Zoom X”.
   - Look for false signals in front of the real signal. False signals can travel through the pipe instead of the medium if there is direct contact between the transducer tip and the pipe. Check for heavy deposits on the transducer or grease from the o-rings on the transducer tip.
   - Look for heavy ringing after the signal. This can be caused by a faulty transducer.
   - Look for distortion of the signal. Clip out a window of the signal by selecting the “Window” button. Then press the “FFT” button. The presented signal should have a top around the signal frequency (150 kHz for gas and 1000 kHz for liquid.) If strong frequency components are found at 3 times the signal frequency, this indicates signal saturation (3rd harmonic content). Possible causes are too high TX gain (Object 423 in the database) or defect input channel on the UAFE board.

5.2. Check signal acquisitions

Open the database of the meter (described in chapter 4.4 or 4.7).
Check the following objects.

- 38-49 Gain. The level should be approximately the same on all channels. High gain indicates problem with the transducer or deposits in the transducer port.
- 80-85 S/N ratio raw signals. S/N level on the raw signal is normally between 20 and 40 dB. Large meters and/or Low pressure will give lower S/N levels.

5.3. Check signal processing

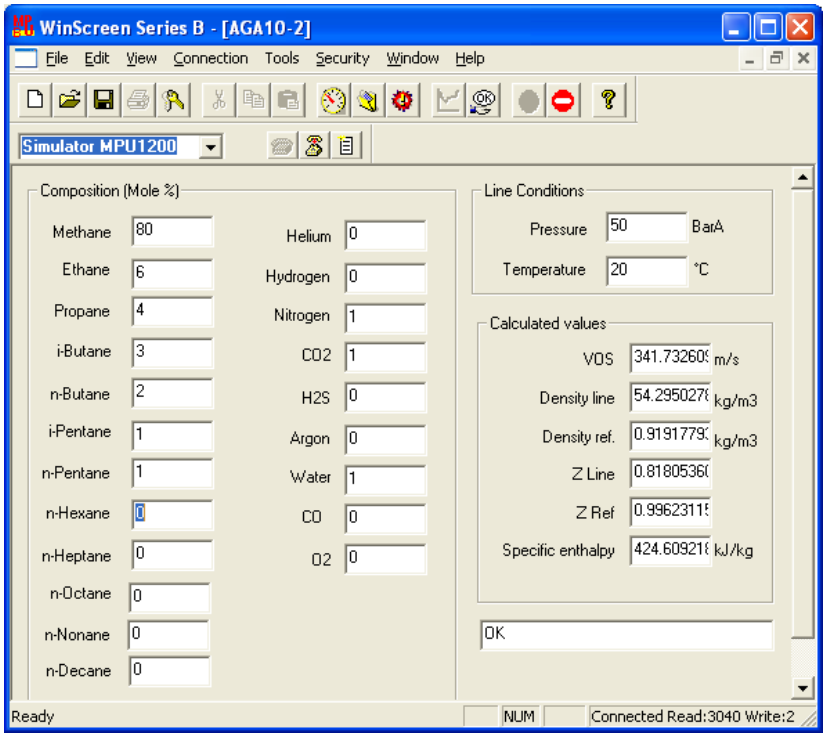
Open the database of the meter (described in chapter 4.4 or 4.7).
Check the following objects.

- Object 0.Check that the log count is counting at a regular pace.
- 26-37 Signal %. This number will indicate how good the signals were identified.
- 86-91 S/N ratios used signals. S/N level on the used signal is normally between 30 and 60 dB. Large meters and/or Low pressure will give lower S/N levels. If “S/N ratio used signals” are below 16 dB the signal are below the minimum quality limit and the measurements might be erroneous.
- 50-61 Transit times. Look for “crazy” values.

5.4. Check flow calculations

Open the database of the meter (described in chapter 4.4 or 4.7).
Check the following objects.

- 14-19 Measured flow velocity. Check that the flow velocities on the different paths form a possible flow profile. Also use the axial and transversal flow graph in the measurements window.
- 20-25 Measured VOS. All paths should read approximately the same VOS.
- 3 Velocity of sound (average). Use AGA 10 (only for gas) or equivalent to verify the velocity of sound. AGA 10 is included in Winscreen. From the main menu select: Tools – AGA10…



5.5. Check I/O system

Open the database of the meter (described in chapter 4.4 or 4.7).
Check the following objects.

- 110 Pulse out requested frequency. This is the frequency generated from the meter. Use external device to verify that the frequency is correct.
- 112 Pulse out total count should count when the meter is generating a frequency. If not, there is a problem with the communication between the DSP and the pulse micro controller (AVR).
- 120-123 Check analog input values.
- 130-135 Check Modbus inputs
- 12-13 Check that correct temperature and pressure is used by the system.

6. OTHER FEATURES

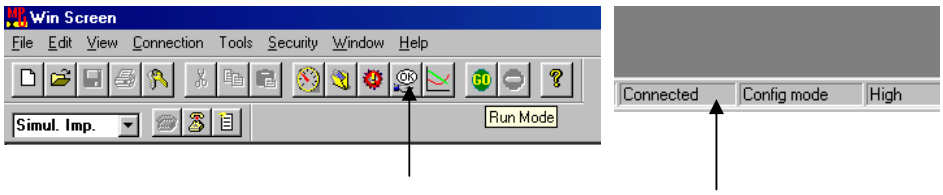
6.1. SWITCHING OPERATING MODE

Warning!!! During normal operation it is not necessary to enter Config mode. All operations that are described in this document can be done in Run Mode. Entering config mode will stop the measurements.

When the meter is in operation mode (Run Mode), the Config mode button is lit. In the lower right corner there is a small window that shows in which mode the meter is operating. This is shown in the pictures below. Run Mode means that the meter is measuring, and Config Mode means that the meter is stopped.

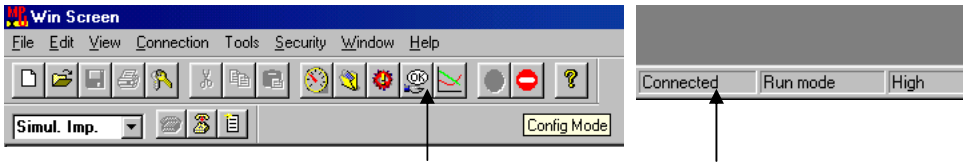
6.1.1. Config Mode

When the meter is in Config Mode, the Run Mode button is valid. Click the Run Mode button to start measurements.

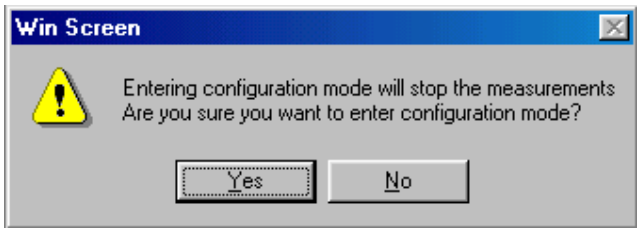


6.1.2. Run Mode

When the meter is in Run Mode, the Config Mode button is valid. Click the Config Mode button to stop the measurements.



If the Config Mode button is clicked, a warning will be shown before the meter stops measuring.



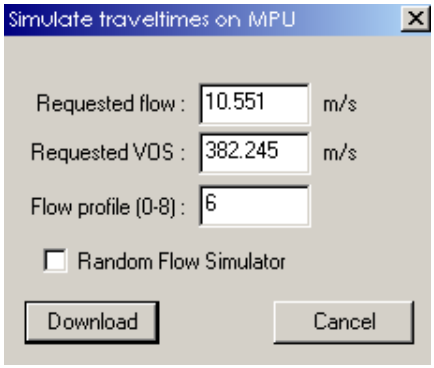
6.2. SIMULATION

Winscreen has the ability to make the ultrasonic meter simulate a given flow velocity. If a selected flow velocity and velocity of sound is entered, the Winscreen program will calculate the travel times and transmit this to the ultrasonic meter. The meter will calculate a volume flow based on these travel times. The calculated values with various units will be presented on the available outputs and communication interfaces. This is especially suited for testing of communication interfaces between the meter and a Flow Computer. To active the Simulator, set Manual Values to ON under the Modes tab in the Database Configuration screen.

Warning!!! The Meter will not measure the actual flow when this function is used.

- Select *Tools* in the main menu in the program.
- Select *Simulation*.
- Select *Simulate transit times*.

The following picture will appear.



- Type in the flow and VOS to be simulated. You can also select various flow profiles to be simulated. (Typical VOS for a gas meter is around 400m/s, while for an Ultra^6 it is around 1400m/s).
- Clicking the Random Flow Simulator box will allow the Simulator to change values by itself
- Then click the Download button.

The ultrasonic meter will now calculate travel times based on the input recently typed in, and it will use the already existing parameters in the database to give the correct flow. Note that transducer delays were not taken into account when the Winscreen program calculated the travel times, therefore there will be a slight deviation between the inserted flow velocity and VOS, and the calculated flow velocity and VOS returned by the ultrasonic meter.

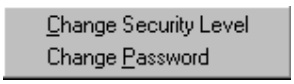
- To return from Run Mode to Simulation Mode, Set Manual Values to OFF under the Modes tab of the Database Configuration Screen

6.3. CHANGE PASSWORD AND SECURITY LEVEL

6.3.1. Change Password.

It is possible to change the password in the Winscreen program.

- Select Security from the main screen.
- Select Change password.



The following picture will be displayed.

- In the column “Old password” type in the old password “High”.
- Type a new password in the column “New password”.
- Retype the new password in the column “Retype password”.
- Click OK.

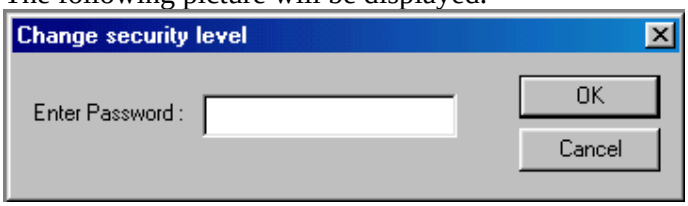
NOTE: Remember to take note of the new password, and store it in a safe place.

6.3.2. Change Security Level

The security level in the Winscreen program can be changed.

- Select Security from the windows menu.
- Select Change security level.

The following picture will be displayed.



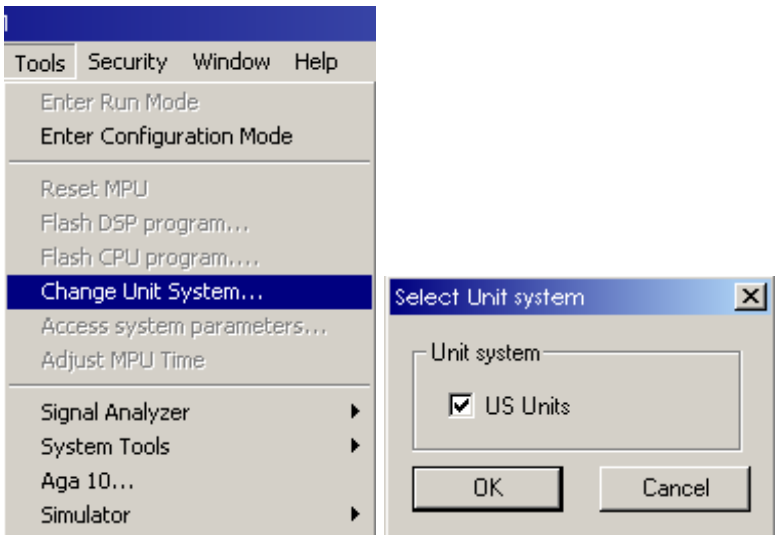
- Type the password for a higher or lower level.
- Click OK.

NOTE: It is highly recommended that the security level normally is set to Low. Only change the security level to high if necessary to change parameters or measurement modes, and return to Low immediately after.

6.4. Change Unit System

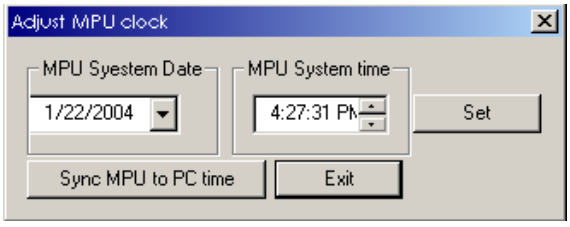
The meter operates with either Metric or US units. The units system is changed under the Tools menu.

Warning! This should not be done while measuring. It the conversion process is interrupted, the database might be corrupted. Always take a backup of the database before executing this command.



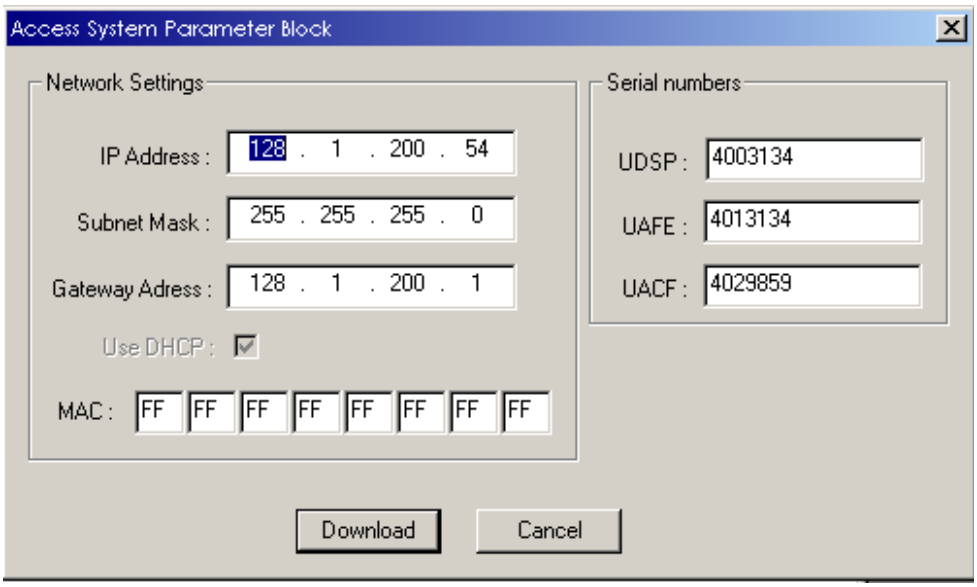
6.5. Adjust Meter time

The meter's internal clock can be reset or synced to a PC with this function.



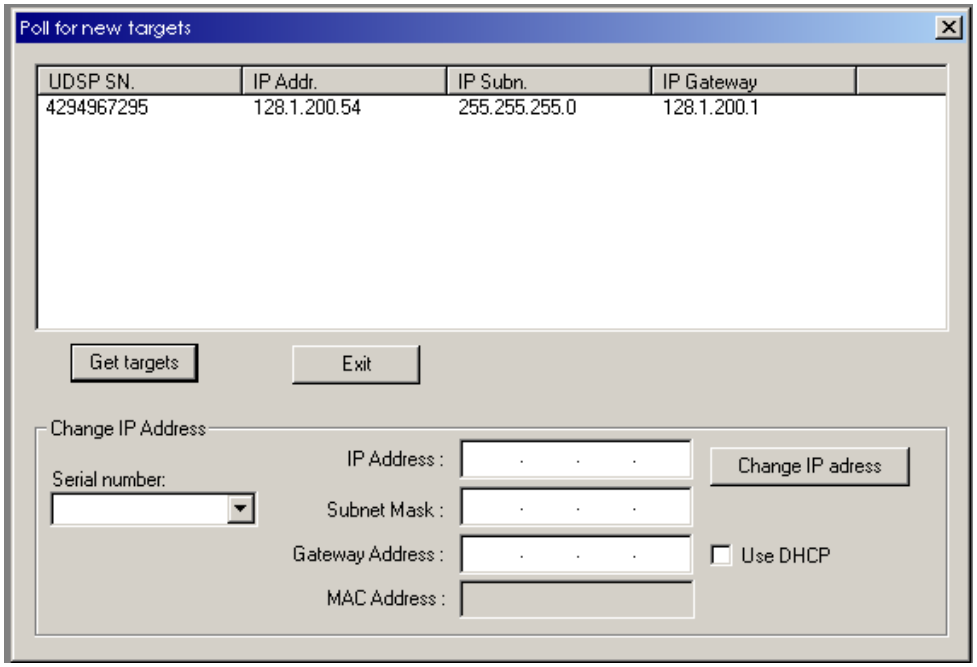
6.6. Access System Parameters

This function allows the user to change the meter's IP address, subnet mask, MAC address, and hardware serial numbers. Serial numbers and MAC address are set in the factory and should **not** be changed without written consent of an FMC service engineer.



6.7. Poll for New Targets

This function allows the user to poll for a meter whose IP address is unknown. The user's PC must be set up to allow any possible IP address (subnet mask set to 0.0.0.0). The meter should be wired directly with a crossover Ethernet cable. All firewalls on the PC needs to be turned of, including the default firewall in Windows XP.



If the IP address still can not be found, connect a serial cable to the meter and read the IP address from the version block in the database.

6.8. Modem Communication

6.8.1. Modem Configuration

Winscreen is designed to communicate to a remote meter via a serial modem over telephone lines. Any commercially available serial modem is compatible, as long as it supports the standard and extended Hayes AT command set.

To configure the modem on the meter side, connect it to the serial port of a PC and communicate to it with HyperTerminal. Send the following AT commands to properly configure the modem:

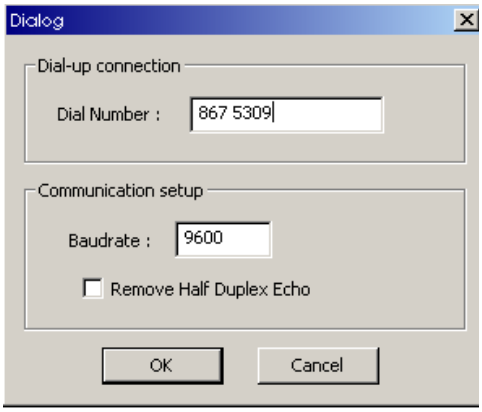
AT &N6 &W	(Sets the maximum line speed to 9600 baud)
AT &U6 &W	(Sets the minimum line speed to 9600 baud)
AT &B0 &W	(Sets the port speed to the line speed)
AT S0=1 &W	(Sets auto-answer pick up to 1 ring)

Additionally, the modem must be set to DTE Override. Some modems accomplish this via dip switches, and others by AT command. If the modem uses AT commands for this function the AT command is:

AT &D0 &W

Once the modem is properly configured, it is connected to the meter via RS-232 serial cable. The wiring is reverse of the normal 232 connection, such that TX connects to Pin 3 and Rx to Pin 1 of COM1 on the meter serial connector. The modem is also connected to an analog phone line.

To remotely dial into a meter, go to Connection, Properties, and type in the remote phone number and click OK.



Select the COM port your PC modem is connected to (found under the Modems tab of the Phone and Modem options control panel) under the connection pull down menu and connect.

Winscreen will automatically dial out. Upon successful connection Winscreen will show a “Modem OK” dialog box. After clicking OK, the Measured Values screen will automatically start after a few seconds.

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7. APPENDIX A –ULTRA^6 DATABASE DESCRIPTION

Version information

Description	Obj.	Modb.	Unit SI	Unit US
UDSP Serial Number	250	500		
Serial number of the UDSP board. This is the mainboard in the electronics containg all digital electronics.				
UAFE Serial Number	251	502		
Serial number of the UAFE board. This is a piggybackboard in the electronics containg the analog front end to the transducers.				
UACF Serial Number	252	504		
Serial number of the UACF board. The power supply board in the electronics is placed under the lid of the box.				
CP Software version	253	506		
Version number of the CP software on the board. The CP (Communication processor) handles all comminication and IO except pulse and digital I/O				
CP Software date	254	508		
The date the CP software was build.				
CP Software build no.	255	510		
The build number of the CP software. This is a running number that is incremented by one for each build.				
CP Software check sum.	256	512		
The checksum is a unique number to simplify identification of software changes				
DSP Software version	257	514		
Version number of the DSP software on the board. The DSP (Digital signal processor) does all the flow measurements				
DSP Software type	258	516		
This number is used to identify what type of software is running on the board. 1200 = MPU1200 600=MPU600 200=MPU200 11200=Ultra6				
DSP Software date	259	518		
The date the DSP software was build.				
DSP Software build no.	260	520		
The build number of the CP software. This is a running number that is incremented by one for each build.				
DSP Software check sum.	261	522		
The checksum is a unique number to simplify identification of software changes				
AVR Software version	262	524		
Version number of the AVR software on the board. The AVR handles pulse generation and digital I/O				
AVR Software check sum.	263	526		
The checksum is unique number to simplify identification of software changes				
Database checksum	266	532		
The checksum is a unique number to simplify identification of database changes				
MAC Address	267	534		
The unique MAC of the ethernet interface on the UDSP board				

Description	Obj.	Modb.	Unit SI	Unit US
IP Address	268	536		
The IP address of the meter. Identifies the meter in an TCP/IP network (normally via Ethernet). All clients (PC's) need to be in the same subnet as the meter				
Subnet Mask	269	538		
The subnet mask specifies the type of subnet. (Normal value is 255.255.255.0, class C network)				
Gateway Address	270	540		
The gateway address specifies the address of the router in the network in case meter and clients are on different networks.				

Modes

Description	Obj.	Modb.	Unit SI	Unit US
Run Mode	700	1400		
Specifies the execution mode of the measurements. 0=Config Mode, No calculations are performed. Output of meter is zero. 1=Run mode (Default), Meter is running and measuring normally.				
Temp/Press compensation of diameter	701	1402		
Specifies type of P/T compensation of ID, Path length and Path angle. 0=None 1=Mode A, Tank model. 2=Mode B, Pipe model (Default).				
Linearization Mode	702	1404		
Specify if linearization curve is to be used on high velocities.				
Disable Path	703	1406		
Dissables selected paths. No meaurements will be performed on these paths				
Enable manual values	704	1408		
Enables usage of manual values (600-657).				
Unit mode	705	1410		
Selects between metric or emperial units. Warning! Should always be performed from the tools menu to also convert parameter values.				
Line Pressure Selector	706	1412		
Selects the source of the value (Fallback/Analog/Modbus).				
Line Temperature Selector	707	1414		
Selects the source of the value (Fallback/Analog/Modbus).				

Dimensions

Description	Obj.	Modb.	Unit SI	Unit US
Internal Pipe Diameter	400	800	mm	in
The average diameter of the meter.				
Transducer Path Length 1	401	802	mm	in
The distance between the transducer tips.				
Transducer Path Length 2	402	804	mm	in
The distance between the transducer tips.				
Transducer Path Length 3	403	806	mm	in
The distance between the transducer tips.				
Transducer Path Length 4	404	808	mm	in
The distance between the transducer tips.				
Transducer Path Length 5	405	810	mm	in
The distance between the transducer tips.				
Transducer Path Length 6	406	812	mm	in
The distance between the transducer tips.				
Transducer Path Angle 1	407	814	degree	degree
Angle between the transducer path and flow direction.				
Transducer Path Angle 2	408	816	degree	degree
Angle between the transducer path and flow direction.				
Transducer Path Angle 3	409	818	degree	degree
Angle between the transducer path and flow direction.				
Transducer Path Angle 4	410	820	degree	degree
Angle between the transducer path and flow direction.				
Transducer Path Angle 5	411	822	degree	degree
Angle between the transducer path and flow direction.				
Transducer Path Angle 6	412	824	degree	degree
Angle between the transducer path and flow direction.				
Wall thickness spool piece	413	826	mm	in
Average thickness of the walls in the spool piece. This thickness is used to correctly adjust the dimensions of the meter due to pressure and temperature.				
Measurement Ref. Temperature	414	828	°C	F
Temperature in the spool piece when ID and path lengths were measured. Used for P/T correction of dimensions.				
Meter pipe material	415	830		
Material in spool piece. Used for P/T correction of dimensions.				
Used Linear Thermal expansion coeff	108	216	/degC	/F
The used coefficient for temperature expansion of the spool piece and path lengths / angles based on the selected material in object 415				
Used pressure expansion coeff	109	218	pas	Pas
The used coefficient for pressure expansion of the spool piece and path lengths / angles based on the selected material in object 415				

Setup

Description	Obj.	Modb.	Unit SI	Unit US
Additional delay between firings	420	840	us	us
Additional delay between the ultrasonic firings to prevent reflections to influence the transit times. If the number is negative, it is only used for velocities below 4m/s.				
Number of transducer calibration nodes	421	842	-	-
Number of transducer calibration nodes to be selectable by the software. See also zero calibration values at object number 500-599.				
Signal AD value Setpoint	422	844	-	-
The setpoint of the received signal amplitude for the gain controller. Range 0-5. Gain controller adjust the gain (object 38-49) to get the average signal amplitude close to the setpoint.				
Tx Gain (0=Auto Gain)	423	846	-	-
The amplitude in % on the transmitted signal. Reducing the transmitted signal strength reduces the risk of signal saturation (important on high pressures at small meters.)				
Max Number of signals	426	852	-	-

Rate calibration

Description	Obj.	Modb.	Unit SI	Unit US
Rate Correction factor A (Pos Dir)	416	832	-	-
Adjustment factors of the measured flow rate for positive flow direction. Correction formula Q = Ax+B, where x is the originally measured flowrate. A and B factors usually found after flow calibration of the meter.				
Rate Correction factor B (Pos Dir)	417	834	m³/h	bph
Adjustment factors of the measured flow rate for positive flow direction. Correction formula Q = Ax+B, where x is the originally measured flowrate. A and B factors usually found after flow calibration of the meter.				
Rate Correction factor A (Neg Dir)	418	836	-	-
Adjustment factors of the measured flow rate for negative flow direction. Correction formula Q = Ax+B, where x is the originally measured flowrate. A and B factors usually found after flow calibration of the meter.				
Rate Correction factor B (Neg Dir)	419	838	m³/h	bph
Adjustment factors of the measured flow rate for negative flow direction. Correction formula Q = Ax+B, where x is the originally measured flowrate. A and B factors usually found after flow calibration of the meter.				
Rate Calibr. point 1 Flow rate	527	1054	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 1 K-Factor	528	1056	-	-
Rate Calibr. point 2 Flow rate	529	1058	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 2 K-Factor	530	1060	-	-
Rate Calibr. point 3 Flow rate	531	1062	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 3 K-Factor	532	1064	-	-
Rate Calibr. point 4 Flow rate	533	1066	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 4 K-Factor	534	1068	-	-
Rate Calibr. point 5 Flow rate	535	1070	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 5 K-Factor	536	1072	-	-

Description	Obj.	Modb.	Unit SI	Unit US
Rate Calibr. point 6 Flow rate	537	1074	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 6 K-Factor	538	1076	-	-
Rate Calibr. point 7 Flow rate	539	1078	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 7 K-Factor	540	1080	-	-
Rate Calibr. point 8 Flow rate	541	1082	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 8 K-Factor	542	1084	-	-
Rate Calibr. point 9 Flow rate	543	1086	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 9 K-Factor	544	1088	-	-
Rate Calibr. point 10 Flow rate	545	1090	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 10 K-Factor	546	1092	-	-
Rate Calibr. point 11 Flow rate	547	1094	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 11 K-Factor	548	1096	-	-
Rate Calibr. point 12 Flow rate	549	1098	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 12 K-Factor	550	1100	-	-
Rate Calibr. point 13 Flow rate	551	1102	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 13 K-Factor	552	1104	-	-
Rate Calibr. point 14 Flow rate	553	1106	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 14 K-Factor	554	1108	-	-
Rate Calibr. point 15 Flow rate	555	1110	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 15 K-Factor	556	1112	-	-
Rate Calibr. point 16 Flow rate	557	1114	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 16 K-Factor	558	1116	-	-
Rate Calibr. point 17 Flow rate	559	1118	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 17 K-Factor	560	1120	-	-
Rate Calibr. point 18 Flow rate	561	1122	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 18 K-Factor	562	1124	-	-
Rate Calibr. point 19 Flow rate	563	1126	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 19 K-Factor	564	1128	-	-
Rate Calibr. point 20 Flow rate	565	1130	m³/h	bph
Identifies the flow rate for this calibration point.				
Rate Calibr. point 20 K-Factor	566	1132	-	-

Limits

Description	Obj.	Modb.	Unit SI	Unit US
Low flow cutoff limit	430	860	m/s	ft/sec
Below this velocity limit the flow will be set to 0.				
Max VOS	431	862	m/s	ft/sec
Above this velocity of sound limit the VOS error alarm will be set.				
Min VOS	432	864	m/s	ft/sec
Below this velocity of sound limit the VOS error alarm will be set.				
Max Flow	433	866	m/s	ft/sec
Above this flow velocity the too high flow alarm will be set.				
Min Flow	434	868	m/s	ft/sec
Below this flow velocity the too low flow alarm will be set.				
Min Signals used	435	870	%	%
If the signal % drops below this limit, the signal % low alarm wil be set.				
Max Gain	436	872	-	-
If the the gain raiser above this limit, the gain high alarm wil be set.				
Max Gain Difference	437	874	%	%
If the gain on individual paths differs more than the specified limit compared to the median gain.				
Max VOS deviation	438	876	m/s	ft/sec
If the VOS on individual paths differs more than the specified limit compared to the median VOS.				
Min S/N ratio (Processed signal)	439	878	dB	dB
If the signal level (compared) to the noise drops below this level the S/N ratio alarm will be set				
Max turbulence level	440	880	%	%
If the variation in flow velocity (pr. path) is larger then the specified limit, the turbulence alarm will be set				
Max deviation Profile Flatness	441	882	%	%
If the profile flatness differs more than the specified limit the alarm will set.				
Max deviation Profile Symetry	442	884	%	%
If the profile symetry differs more than the specified limit the alarm will set.				
Max deviation Swirl/crossflow)	443	886	%	%
If the transversiol flow differs more than the specified limit the alarm will set.				

Profile

Description	Obj.	Modb.	Unit SI	Unit US
Lower flow limit, profile correction	446	892	m/s	ft/sec
Below this limit no flow profile checking and path substitution will be performed. Path substitution is still possible by VOS checking based on Max VOS deviation (438).				
Allowed VOS profile dev.center pair	447	894	m/s	ft/sec
Below this limit a both center paths (3 and 4) will be used for calculation reference VOS.				
Profile learner, Minimum velocity	448	896	m/s	ft/sec
Below minimum velocity the reference flow profile will not be updated.				
Profile learner, Maximum velocity	449	898	m/s	ft/sec
Above maximum velocity the reference flow profile will not be updated.				
Profile learner, Path Quality limit	451	902	-	-
Below this quality limit (signal %), the reference flow profile will not be updated.				
Profile learner, Averaged cycles	452	904	-	-
The average flow profile of the specified number of mesurement cycles will be used for the reference flow profile.				
Profile learner, Stability Req.	453	906	-	-
Factor used to verify stability of flow profile before recording.				
Reference/Initital flow profile factors 1	454	908	-	-
Reference flow profile.				
Reference/Initital flow profile factors 2	455	910	-	-
Reference flow profile.				
Reference/Initital flow profile factors 3	456	912	-	-
Reference flow profile.				
Reference/Initital flow profile factors 4	457	914	-	-
Reference flow profile.				
Reference/Initital flow profile factors 5	458	916	-	-
Reference flow profile.				
Reference/Initital flow profile factors 6	459	918	-	-
Reference flow profile.				
Allowed Vel.profile deviation	460	920	us	us
If the measured flow velocity for the path differs more than the specified limit calculated in us, the path is substituted				
Allowed VOS.profile deviation	461	922	us	us
If the measured velocity of sound for the path differs more than the specified limit calculated in us, the path is substituted				
Profile indication level	462	924	-	-

IO

Description	Obj.	Modb.	Unit SI	Unit US
Reverse flow pulse handling	474	948	-	-
Selects how pulses will be handled in reverse flow. 0=Pulses generated on first output pair regardless of direction. 1=Pulses generated on second output pair in case of reverse flow.				
Pulse output rating	475	950	pulses/m^3	pulses/BBL
Specifies the scaling of the pulse frequency from the flow rate.				
Pulse/AO update rate	476	952	sec	sec
Specifies how often the pulse output and analog output will be updated.				
Modbus averager update rate	477	954	sec	sec
Specifies how often Modbus registers will be updated.				
Slot 1 IO Type	478	956	-	-
Selects the type of module in the slot. 0=4-20mA input for Temperature. 1=4-20mA input for Pressure. 4=4-20mA output for flow rate. 5=4-20mA output for flow rate at standard conditions. 10=No module installed.				
Slot 1 Max value	479	958	-	-
Maximum value of physical value being measured/output				
Slot 1 Min value	480	960	-	-
Minimum value of physical value being measured/output				
Slot 1 calibration factor A	481	962	-	-
Calibration factor applied to the normalised converter count value				
Slot 1 calibration factor B	482	964	-	-
Calibration factor applied to the normalised converter count value				
Slot 1 calibration factor CAL1	483	966	-	-
Calibration factor of the module (printed on the module).				
Slot 1 calibration factor CAL2	484	968	-	-
Calibration factor of the module (printed on the module).				

Description	Obj.	Modb.	Unit SI	Unit US
Slot 2 IO Type	485	970	-	-
Selects the type of module in the slot. 0=4-20mA input for Temperature. 1=4-20mA input for Pressure. 4=4-20mA output for flow rate. 5=4-20mA output for flow rate at standard conditions. 10=No module installed.				
Slot 2 Max value	486	972	-	-
Maximum value of physical value being measured/output				
Slot 2 Min value	487	974	-	-
Minimum value of physical value being measured/output				
Slot 2 calibration factor A	488	976	-	-
Calibration factor applied to the normalised converter count value				
Slot 2 calibration factor B	489	978	-	-
Calibration factor applied to the normalised converter count value				
Slot 2 calibration factor CAL1	490	980	-	-
Calibration factor of the module (printed on the module).				
Slot 2 calibration factor CAL2	491	982	-	-
Calibration factor of the module (printed on the module).				
Com1 Duplex mode	492	984		
Selects full or half duplex. Half duplex is used on RS485, two wires (Tx and Rx are send on the same pair).				
Com2 Modbus node number	493	986	-	-
Modbus node number for multidrop networks. Use node number 1 for 1-to-1 connections				
Com2 Baudrate	494	988	-	-
Communication speed. Meter and client (PC) needs to use the same baudrate.				
Com2 Duplex mode	495	990		
Selects full or half duplex. Half duplex is used on RS485, two wires (Tx and Rx are send on the same pair).				

Misc.

Description	Obj.	Modb.	Unit SI	Unit US
Transducer X-ref	463	926	-	-
Outer Path Weight	464	928	-	-
Prove volume	465	930	m^3	bbl
Pulse bias	466	932	-	-
Debug Mode	467	934		
Select the usage of the debug buffer.¨				
Lateral position 1	468	936	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				
Lateral position 2	469	938	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				
Lateral position 3	470	940	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				

Description	Obj.	Modb.	Unit SI	Unit US
Lateral position 4	471	942	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				
Lateral position 5	472	944	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				
Lateral position 6	473	946	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				

FallbackValues

Description	Obj.	Modb.	Unit SI	Unit US
Fallback value - Line Pressure	660	1320	bara	psiA
Fallback value for pressure. Used if fallback is selected in the Line Pressure Selector (406), or value is not updated on Modbus or Analog module.				
Fallback value - Line Temperature	661	1322	°C	F
Fallback value for pressure. Used if fallback is selected in the Line Temperature Selector (407), or value is not updated on Modbus or Analog module.				

Transducer Calibration node 1

Description	Obj.	Modb.	Unit SI	Unit US
Node 1 Pressure	500	1000	bara	psiA
Identifies the pressure for this node during transducer calibration.				
Node 1 Temperature	501	1002	°C	F
Identifies the temperature for this node during transducer calibration.				
Node 1 Signal Type	502	1004	-	-
Identifies the signal type for this node during transducer calibration.				
Node 1 Tr. Delay 1	503	1006	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 1 Tr. Delay 2	504	1008	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 1 Tr. Delay 3	505	1010	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 1 Tr. Delay 4	506	1012	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 1 Tr. Delay 5	507	1014	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 1 Tr. Delay 6	508	1016	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				

VPC Correction

Description	Obj.	Modb.	Unit SI	Unit US
Number of VPC points	509	1018	-	-
VPC point 1 VPC X	510	1020	-	-
VPC point 1 Correction	511	1022	%	%
VPC point 2 VPC X	512	1024	-	-
VPC point 2 Correction	513	1026	%	%
VPC point 3 VPC X	514	1028	-	-
VPC point 3 Correction	515	1030	%	%
VPC point 4 VPC X	516	1032	-	-
VPC point 4 Correction	517	1034	%	%
VPC point 5 VPC X	518	1036	-	-
VPC point 5 Correction	519	1038	%	%
VPC point 6 VPC X	520	1040	-	-
VPC point 6 Correction	521	1042	%	%
VPC point 7 VPC X	522	1044	-	-
VPC point 7 Correction	523	1046	%	%
VPC point 8 VPC X	524	1048	-	-
VPC point 8 Correction	525	1050	%	%

Measured values

Description	Obj.	Modb.	Unit SI	Unit US
Log Count	0	0	-	-
This counter is incremented by one each time the meter has calculated a new flow rate. Rolls over at 65536.				
Alarm Status	1	2	-	-
The alarm status is a bit coded value. Each alarm has a value, and the values are added. 1=Too high flow 2=Electronics failure 4=Tranducer failure 8=Calculation error 16=Signal % low 32=Gain error 64=VOS difference 128=Path substitution 256Parameter error 512=S/N ratio low 1024=Turbulence level high 2048=Profile deviation high				
Flow Velocity	2	4	m/s	ft/sec
Measured flow velocity through meter (Integrated across all paths)				
Velocity of Sound	3	6	m/s	ft/sec
Measured velocity of sound. (Average for all paths)				
Actual Volum Flowrate	4	8	m^3/h	bph
Measured volume flowrate.				
Accumulated Volume Forward	5	10	m^3	bbl
Accumulated volume in forward flow direction. Rolls over at 1000000000 (1E9) m3. Always accumulating in forward flow.				
Accumulated Volume Reverse	6	12	m^3	bbl
Accumulated volume in reverse flow direction. Rolls over at 1000000000 (1E9) m3. Always accumulating in reverse flow.				
Profile flatness (Center/Outer Paths)	7	14	%	%
Amount of flow on the outer paths compared to the center paths				
Profile symetry (Upper/Lower Paths)	8	16	%	%
Amount of flow on the top paths compared to the bottom paths				
Swirl flow	9	18	%	%
Amount of flow rotation (clockwise)				
Cross flow	10	20	%	%
Amounbt of dual vortex rotation				
Increment Time Duration	11	22	sec	sec
Time elapsed since last update of MODBUS registers. (See also object 10.)				
Used Line Pressure	12	24	bara	psiA
Line pressure (at meter) used in caculation for correction of: 1.Dimensions (ID, angle, path lengths) 2.Selection of transducer calibration node 3.Correction of zero calibration data. Source (Analog/Modbus/Fallback) is selected by object 706.				

Description	Obj.	Modb.	Unit SI	Unit US
Used Line Temperature	13	26	°C	F
Line temperature (at meter) used in caculation for correction of: 1.Dimensions (ID, angle, path lengths) 2.Selection of transducer calibration node 3.Correction of zero calibration data. Source (Analog/Modbus/Fallback) is selected by object 707.				
Measured Flow Velocity 1	14	28	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Flow Velocity 2	15	30	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Flow Velocity 3	16	32	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Flow Velocity 4	17	34	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Flow Velocity 5	18	36	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Flow Velocity 6	19	38	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Velocity of Sound 1	20	40	m/s	ft/sec
Velocity of sound measured along each single path.				
Measured Velocity of Sound 2	21	42	m/s	ft/sec
Velocity of sound measured along each single path.				
Measured Velocity of Sound 3	22	44	m/s	ft/sec
Velocity of sound measured along each single path.				
Measured Velocity of Sound 4	23	46	m/s	ft/sec
Velocity of sound measured along each single path.				
Measured Velocity of Sound 5	24	48	m/s	ft/sec
Velocity of sound measured along each single path.				
Measured Velocity of Sound 6	25	50	m/s	ft/sec
Velocity of sound measured along each single path.				
Signals pr. path pr. calculation.	98	196	-	-
Number of signals on each path used to calculate the flow rate update for the pulse out.				

Signal Measurements

Description	Obj.	Modb.	Unit SI	Unit US
Signal Percentage 1A	26	52	%	%
How many of the received signals are used for calculation.				
Signal Percentage 1B	27	54	%	%
How many of the received signals are used for calculation.				
Signal Percentage 2A	28	56	%	%
How many of the received signals are used for calculation.				
Signal Percentage 2B	29	58	%	%
How many of the received signals are used for calculation.				
Signal Percentage 3A	30	60	%	%
How many of the received signals are used for calculation.				
Signal Percentage 3B	31	62	%	%
How many of the received signals are used for calculation.				
Signal Percentage 4A	32	64	%	%
How many of the received signals are used for calculation.				
Signal Percentage 4B	33	66	%	%
How many of the received signals are used for calculation.				
Signal Percentage 5A	34	68	%	%
How many of the received signals are used for calculation.				
Signal Percentage 5B	35	70	%	%
How many of the received signals are used for calculation.				
Signal Percentage 6A	36	72	%	%
How many of the received signals are used for calculation.				
Signal Percentage 6B	37	74	%	%
How many of the received signals are used for calculation.				
Gain 1A	38	76	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 1B	39	78	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 2A	40	80	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 2B	41	82	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 3A	42	84	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 3B	43	86	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 4A	44	88	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 4B	45	90	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				

Description	Obj.	Modb.	Unit SI	Unit US
Gain 5A	46	92	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 5B	47	94	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 6A	48	96	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 6B	49	98	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				

Travel times

Description	Obj.	Modb.	Unit SI	Unit US
Raw transit time A 1	68	136	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time A 2	69	138	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time A 3	70	140	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time A 4	71	142	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time A 5	72	144	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time A 6	73	146	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time Diff B-A 1	74	148	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				
Raw transit time Diff B-A 2	75	150	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				
Raw transit time Diff B-A 3	76	152	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				
Raw transit time Diff B-A 4	77	154	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				
Raw transit time Diff B-A 5	78	156	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				
Raw transit time Diff B-A 6	79	158	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				

Profile

Description	Obj.	Modb.	Unit SI	Unit US
Uncorrected flow velocity 1	80	160	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected flow velocity 2	81	162	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected flow velocity 3	82	164	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected flow velocity 4	83	166	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected flow velocity 5	84	168	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected flow velocity 6	85	170	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected velocity of sound 1	86	172	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Uncorrected velocity of sound 2	87	174	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Uncorrected velocity of sound 3	88	176	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Uncorrected velocity of sound 4	89	178	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Uncorrected velocity of sound 5	90	180	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Uncorrected velocity of sound 6	91	182	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Travel time correction count 1	204	408		
Indicates how many times the travel time on that specific path have been substituted.				
Travel time correction count 2	205	410		
Indicates how many times the travel time on that specific path have been substituted.				
Travel time correction count 3	206	412		
Indicates how many times the travel time on that specific path have been substituted.				
Travel time correction count 4	207	414		
Indicates how many times the travel time on that specific path have been substituted.				
Travel time correction count 5	208	416		
Indicates how many times the travel time on that specific path have been substituted.				
Travel time correction count 6	209	418		
Indicates how many times the travel time on that specific path have been substituted.				

S/N measuremets

Description	Obj.	Modb.	Unit SI	Unit US
S/N ratio raw signal 1	50	100	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio raw signal 2	51	102	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio raw signal 3	52	104	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio raw signal 4	53	106	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio raw signal 5	54	108	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio raw signal 6	55	110	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 1	56	112	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 2	57	114	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 3	58	116	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 4	59	118	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 5	60	120	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 6	61	122	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
Turbulence level 1	62	124	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				
Turbulence level 2	63	126	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				
Turbulence level 3	64	128	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				
Turbulence level 4	65	130	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				
Turbulence level 5	66	132	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				
Turbulence level 6	67	134	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				

Other calculations

Description	Obj.	Modb.	Unit SI	Unit US
Prove Run No.	100	200	-	-
Average Flow rate	101	202	m^3/h	bph
MM Factor	102	204	pulses/m^3	pulses/BBL
Prove Time	103	206	sec	sec
Accumulated prove volume	104	208	m^3	bbl
Accumulated master meter pulses	105	210	-	-
VPC X	106	212	-	-
VPC Correction	107	214	%	%

IO values

Description	Obj.	Modb.	Unit SI	Unit US
Pulse out requested frequency	110	220	Hz	Hz
Current frequency generated on the pulse output.				
Time stamp	111	222	sec	sec
Time stamp of last frequency change				
Pulse out total count forward	112	224	-	-
Internal pulse counter inside the AVR processor. If this is moving, the AVR is running				
Pulse In 1 Count	113	226	-	-
Received number of pulses on the digital input 1				
Pulse In 2 Count	114	228	-	-
Received number of pulses on the digital input 2				
Freq In 1	115	230	-	-
Current frequency on digital input 1				
Freq In 2	116	232	-	-
Current frequency on digital input 2				
Slot 1 Count value	120	240	-	-
The digital value read/sent to the analog module				
Slot 2 Count value	121	242	-	-
The digital value read/sent to the analog module				
Analog Temperature Input	122	244	°C	F
Temperature value read from temperature transmitter. The selector object (707) needs to be set to analog to use this value				
Analog Pressure Input	123	246	bara	psiA
Pressure value read from pressure transmitter. The selector object (706) needs to be set to analog to use this value				
Line pressure, Modbus	130	260	bara	psiA
Temperature value received from modbus link. The selector object (707) needs to be set to modbus to use this value				
Line temperature, Modbus	131	262	°C	F
Pressure value received from modbus link. The selector object (706) needs to be set to modbus to use this value				

Status / Errors

Description	Obj.	Modb.	Unit SI	Unit US
Log Count	200	400	-	-
This counter is incremented by one each time the meter has calculated a new flow rate. Rolls over at 65536.				
Alarm Status	201	402		
The alarm status is a bit coded value. Each alarm has a value, and the values are added. 1=Too high flow 2=Electronics failure 4=Tranducer failure 8=Calculation error 16=Signal % low 32=Gain error 64=VOS difference 128=Path substitution 256Parameter error 512=S/N ratio low 1024=Turbulence level high 2048=Profile deviation high				
Currently used transducer calibration node	202	404		
Transducer calibration node is selected based on used temerature and pressure.				
Profile Learner State	203	406		
Indicates the current status for recording of the current profile. 0=Learning 1=Flow velocity outside learning range (No learning). 2=Unstable flow profile (No learning) 3=Low quality of measurements (No learning).				
Too low flow	216	432		
This alarm is set when the flow velocity is higher than the alarm limit set in object 433. 0=OK 1=Alarm				
Too high flow	217	434		
This alarm is set when the flow velocity is higher than the alarm limit set in object 434. 0=OK 1=Alarm				
Electronics failure	218	436		
This alarm is set when the electronics have detectable internal probem i.e. interprocessor communication. Bit code: 1=Pulse module error				
Transducer Failure	219	438		
When the signal % is low or gain is high, the transducer failure alarm is set. Bit code: 1=1A 2=1B 4=2A 8=2B 16=3A 32=3B 64=4A 128=4B 256=5A 512=5B 1024=6A 2048=6B				
Calculation error	220	440		
This alarm is set when it is impossible to calculate a flow. Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
Signal % low	221	442		
This alarm is set when the signal % is lower than the alarm limit set in object 435 Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
Gain High	222	444		
This alarm is set when the gain is higher than the alarm limit set in object 436 Bit code: 1=1A 2=1B 4=2A 8=2B 16=3A 32=3B 64=4A 128=4B 256=5A 512=5B 1024=6A 2048=6B				
Gain deviation	223	446		
This alarm is set when the gain of the path differs more from the median than the alarm limit set in object 437 Bit code: 1=1A 2=1B 4=2A 8=2B 16=3A 32=3B 64=4A 128=4B 256=5A 512=5B 1024=6A 2048=6B				

Description	Obj.	Modb.	Unit SI	Unit US
VOS Difference	224	448		
This alarm is set when the VOS of the path differs more from the median than the alarm limit set in object 438 Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
Path substitution indication	225	450		
This alarm is set if the path velocity and VOS is substituted because of wrong measurement. Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
S/N ratio low	226	452		
This alarm is set when the S/N level of the used (processed) signal is lower than the alarm limit set in object 439. Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
Turbulence level high	227	454		
This alarm is set when the turbulence level of the path is higher than the alarm limit set in object 440. Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
Flow profile deviation	228	456		
This alarm is set when the flow profile differes more from the reference profile than the alarm limit set in object 441-443 Bit code: 1=Profile Flatness Alarm, 2=Profile Symetry alarm, 4=Swirl flow alarm, 8=Cross flow alarm				

Hi-res Accumulators

Description	Obj.	Modb.	Unit SI	Unit US
Accumulated volume forward (m3)	230	460		
Non-resetable Accumulator for forward flow. (Integer part)				
Accumulated volume forward (m3*1E-9)	231	462		
Non-resetable Accumulator for forward flow. (Fraction part)				
Accumulated volume reverse (m3)	232	464		
Non-resetable Accumulator for reverse flow. (Integer part)				
Accumulated volume reverse (m3*1E-9)	233	466		
Non-resetable Accumulator for reverse flow. (Fraction part)				
Accumulated error volume forward (m3)	234	468		
Non-resetable Accumulators. Only accumulating when there is an active alarm				
Accumulated error volume forward (m3*1E-9)	235	470		
Non-resetable Accumulators. Only accumulating when there is an active alarm				
Accumulated error volume reverse (m3)	236	472		
Non-resetable Accumulators. Only accumulating when there is an active alarm				
Accumulated error volume reverse (m3*1E-9)	237	474		
Non-resetable Accumulators. Only accumulating when there is an active alarm				

External input

Description	Obj.	Modb.	Unit SI	Unit US
External update of Line Pressure	1000	2000	bara	psiA
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value. Note that register 10000-10028 is containg the same set of registers as 1000-1028 (for backward compatability).				
External update of Line Temperature	1001	2002	°C	F
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				

8. APPENDIX B – MPU 1200 DATABASE DESCRIPTION

Version information

Description	Obj.	Modb.	Unit SI	Unit US
UDSP Serial Number	250	500		
Serial number of the UDSP board. This is the mainboard in the electronics containg all digital electronics.				
UAFE Serial Number	251	502		
Serial number of the UAFE board. This is a piggybackboard in the electronics containg the analog front end to the transducers.				
UACF Serial Number	252	504		
Serial number of the UACF board. The power supply board in the electronics is placed under the lid of the box.				
CP Software version	253	506		
Version number of the CP software on the board. The CP (Communication processor) handles all comminication and IO except pulse and digital I/O				
CP Software date	254	508		
The date the CP software was build.				
CP Software build no.	255	510		
The build number of the CP software. This is a running number that is incremented by one for each build.				
CP Software check sum.	256	512		
The checksum is a unique number to simplify identification of software changes				
DSP Software version	257	514		
Version number of the DSP software on the board. The DSP (Digital signal processor) does all the flow measurements				
DSP Software type	258	516		
This number is used to identify what type of software is running on the board. 1200 = MPU1200 600=MPU600 200=MPU200 11200=Ultra6				
DSP Software date	259	518		
The date the DSP software was build.				
DSP Software build no.	260	520		
The build number of the CP software. This is a running number that is incremented by one for each build.				
DSP Software check sum.	261	522		
The checksum is a unique number to simplify identification of software changes				
AVR Software version	262	524		
Version number of the AVR software on the board. The AVR handles pulse generation and digital I/O				
AVR Software check sum.	263	526		
The checksum is unique number to simplify identification of software changes				
Database checksum	266	532		
The checksum is a unique number to simplify identification of database changes				
MAC Address	267	534		
The unique MAC of the ethernet interface on the UDSP board				

Description	Obj.	Modb.	Unit SI	Unit US
IP Address	268	536		
The IP address of the meter. Identifies the meter in an TCP/IP network (normally via Ethernet). All clients (PC's) need to be in the same subnet as the meter				
Subnet Mask	269	538		
The subnet mask specifies the type of subnet. (Normal value is 255.255.255.0, class C network)				
Gateway Address	270	540		
The gateway address specifies the address of the router in the network in case meter and clients are on different networks.				

Modes

Description	Obj.	Modb.	Unit SI	Unit US
Run Mode	700	1400		
Specifies the execution mode of the measurements. 0=Config Mode, No calculations are performed. Output of meter is zero. 1=Run mode (Default), Meter is running and measuring normally.				
Temp/Press compensation of diameter	701	1402		
Specifies type of P/T compensation of ID, Path length and Path angle. 0=None 1=Mode A, Tank model. 2=Mode B, Pipe model (Default).				
Linearization Mode	702	1404		
Specify if linearization curve is to be used on high velocities.				
Disable Path	703	1406		
Dissables selected paths. No meaurements will be performed on these paths				
Enable manual values	704	1408		
Enables usage of manual values (600-657).				
Unit mode	705	1410		
Selects between metric or emperial units. Warning! Should always be performed from the tools menu to also convert parameter values.				
Line Pressure Selector	706	1412		
Selects the source of the value (Fallback/Analog/Modbus).				
Line Temperature Selector	707	1414		
Selects the source of the value (Fallback/Analog/Modbus).				
Density Selector	708	1416		
Selects the source of the value (Fallback/Modbus/Calculated).				
Compressibility Selector	709	1418		
Selects the source of the value (Fallback/Modbus/Calculated).				
DECA Selector	710	1420		
Selects the DECA algorthm. 0=No Daca Calculations 1=DECA A, Uses P/T and gas composition to calculate VOS, density, compressibility, etc. 2=DECA B uses P/T, VOS, and some GC data (N2,H2O,CO2,H2S) and calculates compressibillity, density and GC. 3=DECA C, uses P/T, Density, and some GC data (N2,H2O,CO2,H2S) and calculates VOS and GC.				
Composition Selector	711	1422		
Selects the source of the GC data used for the DECA calculations (Fallback/Modbus).				

Dimensions

Description	Obj.	Modb.	Unit SI	Unit US
Internal Pipe Diameter	400	800	mm	in
The average diameter of the meter.				
Transducer Path Length 1	401	802	mm	in
The distance between the transducer tips.				
Transducer Path Length 2	402	804	mm	in
The distance between the transducer tips.				
Transducer Path Length 3	403	806	mm	in
The distance between the transducer tips.				
Transducer Path Length 4	404	808	mm	in
The distance between the transducer tips.				
Transducer Path Length 5	405	810	mm	in
The distance between the transducer tips.				
Transducer Path Length 6	406	812	mm	in
The distance between the transducer tips.				
Transducer Path Angle 1	407	814	degree	degree
Angle between the transducer path and flow direction.				
Transducer Path Angle 2	408	816	degree	degree
Angle between the transducer path and flow direction.				
Transducer Path Angle 3	409	818	degree	degree
Angle between the transducer path and flow direction.				
Transducer Path Angle 4	410	820	degree	degree
Angle between the transducer path and flow direction.				
Transducer Path Angle 5	411	822	degree	degree
Angle between the transducer path and flow direction.				
Transducer Path Angle 6	412	824	degree	degree
Angle between the transducer path and flow direction.				
Wall thickness spool piece	413	826	mm	in
Average thickness of the walls in the spool piece. This thickness is used to correctly adjust the dimensions of the meter due to pressure and temperature.				
Measurement Ref. Temperature	414	828	°C	F
Temperature in the spool piece when ID and path lengths were measured. Used for P/T correction of dimensions.				
Meter pipe material	415	830		
Material in spool piece. Used for P/T correction of dimensions.				
Used Linear Thermal expansion coeff	108	216	/degC	/F
The used coefficient for temperature expansion of the spool piece and path lengths / angles based on the selected material in object 415				
Used pressure expansion coeff	109	218	pas	Pas
The used coefficient for pressure expansion of the spool piece and path lengths / angles based on the selected material in object 415				

Setup

Description	Obj.	Modb.	Unit SI	Unit US
Additional delay between firings	420	840	us	us
Additional delay between the ultrasonic firings to prevent reflections to influence the transit times. If the number is negative, it is only used for velocities below 4m/s.				
Number of transducer calibration nodes	421	842	-	-
Number of transducer calibration nodes to be selectable by the software. See also zero calibration values at object number 500-599.				
Signal AD value Setpoint	422	844	-	-
The setpoint of the received signal amplitude for the gain controller. Range 0-5. Gain controller adjust the gain (object 38-49) to get the average signal amplitude close to the setpoint.				
Tx Gain (0=Auto Gain)	423	846	-	-
The amplitude in % on the transmitted signal. Reducing the transmitted signal strength reduces the risk of signal saturation (important on high pressures at small meters.)				
Linearization number	424	848	-	-
Specifies the amount of linearization that is needed to prevent overreading on high velocities.				
Linearization number High	425	850	-	-
Transducer adressing (123456=Normal sequence)				
Max Number of signals	426	852	-	-
Signal correction	427	854	-	-
Transducer Calibration Correction Mode	428	856		
Selects the type of adjustment applied to the transducer calibration data. 0 = Frequency - Uses the resonanse frequency of the transducer to adjust tranducer delay. 1 = Pressure/Temperature based correction (Default) 2 = No correction				
Transducer Type	429	858		

Rate calibration

Description	Obj.	Modb.	Unit SI	Unit US
Rate Correction factor A (Pos Dir)	416	832	-	-
Adjustment factors of the measured flow rate for positive flow direction. Correction formula Q = Ax+B, where x is the originally measured flowrate. A and B factors usually found after flow calibration of the meter.				
Rate Correction factor B (Pos Dir)	417	834	m³/h	ft³/h
Adjustment factors of the measured flow rate for positive flow direction. Correction formula Q = Ax+B, where x is the originally measured flowrate. A and B factors usually found after flow calibration of the meter.				
Rate Correction factor A (Neg Dir)	418	836	-	-
Adjustment factors of the measured flow rate for negative flow direction. Correction formula Q = Ax+B, where x is the originally measured flowrate. A and B factors usually found after flow calibration of the meter.				
Rate Correction factor B (Neg Dir)	419	838	m³/h	ft³/h
Adjustment factors of the measured flow rate for negative flow direction. Correction formula Q = Ax+B, where x is the originally measured flowrate. A and B factors usually found after flow calibration of the meter.				
Rate Calibr. point 1 Flow rate	527	1054	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 1 K-Factor	528	1056	-	-

Description	Obj.	Modb.	Unit SI	Unit US
Rate Calibr. point 2 Flow rate	529	1058	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 2 K-Factor	530	1060	-	-
Rate Calibr. point 3 Flow rate	531	1062	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 3 K-Factor	532	1064	-	-
Rate Calibr. point 4 Flow rate	533	1066	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 4 K-Factor	534	1068	-	-
Rate Calibr. point 5 Flow rate	535	1070	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 5 K-Factor	536	1072	-	-
Rate Calibr. point 6 Flow rate	537	1074	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 6 K-Factor	538	1076	-	-
Rate Calibr. point 7 Flow rate	539	1078	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 7 K-Factor	540	1080	-	-
Rate Calibr. point 8 Flow rate	541	1082	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 8 K-Factor	542	1084	-	-
Rate Calibr. point 9 Flow rate	543	1086	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 9 K-Factor	544	1088	-	-
Rate Calibr. point 10 Flow rate	545	1090	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 10 K-Factor	546	1092	-	-
Rate Calibr. point 11 Flow rate	547	1094	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 11 K-Factor	548	1096	-	-
Rate Calibr. point 12 Flow rate	549	1098	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 12 K-Factor	550	1100	-	-
Rate Calibr. point 13 Flow rate	551	1102	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 13 K-Factor	552	1104	-	-
Rate Calibr. point 14 Flow rate	553	1106	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 14 K-Factor	554	1108	-	-
Rate Calibr. point 15 Flow rate	555	1110	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 15 K-Factor	556	1112	-	-
Rate Calibr. point 16 Flow rate	557	1114	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 16 K-Factor	558	1116	-	-
Rate Calibr. point 17 Flow rate	559	1118	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 17 K-Factor	560	1120	-	-
Rate Calibr. point 18 Flow rate	561	1122	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 18 K-Factor	562	1124	-	-
Rate Calibr. point 19 Flow rate	563	1126	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 19 K-Factor	564	1128	-	-
Rate Calibr. point 20 Flow rate	565	1130	m³/h	ft³/h
Identifies the flow rate for this calibration point.				
Rate Calibr. point 20 K-Factor	566	1132	-	-

Limits

Description	Obj.	Modb.	Unit SI	Unit US
Low flow cutoff limit	430	860	m/s	ft/sec
Below this velocity limit the flow will be set to 0.				
Max VOS	431	862	m/s	ft/sec
Above this velocity of sound limit the VOS error alarm will be set.				
Min VOS	432	864	m/s	ft/sec
Below this velocity of sound limit the VOS error alarm will be set.				
Max Flow	433	866	m/s	ft/sec
Above this flow velocity the too high flow alarm will be set.				
Min Flow	434	868	m/s	ft/sec
Below this flow velocity the too low flow alarm will be set.				
Min Signals used	435	870	%	%
If the signal % drops below this limit, the signal % low alarm wil be set.				
Max Gain	436	872	-	-
If the the gain raiser above this limit, the gain high alarm wil be set.				
Max Gain Difference	437	874	%	%
If the gain on individual paths differs more than the specified limit compared to the median gain.				
Max VOS deviation	438	876	m/s	ft/sec
If the VOS on individual paths differs more than the specified limit compared to the median VOS.				
Min S/N ratio (Processed signal)	439	878	dB	dB
If the signal level (compared) to the noise drops below this level the S/N ratio alarm will be set				
Max turbulence level	440	880	%	%
If the variation in flow velocity (pr. path) is larger then the specified limit, the turbulence alarm will be set				
Max deviation Profile Flatness	441	882	%	%
If the profile flatness differs more than the specified limit the alarm will set.				
Max deviation Profile Symetry	442	884	%	%
If the profile symetry differs more than the specified limit the alarm will set.				
Max deviation Swirl/crossflow)	443	886	%	%
If the transversiol flow differs more than the specified limit the alarm will set.				

Profile

Description	Obj.	Modb.	Unit SI	Unit US
Lower flow limit, profile correction	446	892	m/s	ft/sec
Below this limit no flow profile checking and path substitution will be performed. Path substitution is still possible by VOS checking based on Max VOS deviation (438).				
Allowed VOS profile dev.center pair	447	894	m/s	ft/sec
Below this limit a both center paths (3 and 4) will be used for calculation reference VOS.				
Profile learner, Minimum velocity	448	896	m/s	ft/sec
Below minimum velocity the reference flow profile will not be updated.				
Profile learner, Maximum velocity	449	898	m/s	ft/sec
Above maximum velocity the reference flow profile will not be updated.				
Profile learner, Path Quality limit	451	902	-	-
Below this quality limit (signal %), the reference flow profile will not be updated.				
Profile learner, Averaged cycles	452	904	-	-
The average flow profile of the specified number of mesurement cycles will be used for the reference flow profile.				
Profile learner, Stability Req.	453	906	-	-
Factor used to verify stability of flow profile before recording.				
Reference/Initital flow profile factors 1	454	908	-	-
Reference flow profile.				
Reference/Initital flow profile factors 2	455	910	-	-
Reference flow profile.				
Reference/Initital flow profile factors 3	456	912	-	-
Reference flow profile.				
Reference/Initital flow profile factors 4	457	914	-	-
Reference flow profile.				
Reference/Initital flow profile factors 5	458	916	-	-
Reference flow profile.				
Reference/Initital flow profile factors 6	459	918	-	-
Reference flow profile.				
Allowed Vel.profile deviation	460	920	us	us
If the measured flow velocity for the path differs more than the specified limit calculated in us, the path is substituted				
Allowed VOS.profile deviation	461	922	us	us
If the measured velocity of sound for the path differs more than the specified limit calculated in us, the path is substituted				
Profile indication level	462	924	-	-

IO

Description	Obj.	Modb.	Unit SI	Unit US
Reverse flow pulse handling	474	948	-	-
Selects how pulses will be handled in reverse flow. 0=Pulses generated on first output pair regardless of direction. 1=Pulses generated on second output pair in case of reverse flow.				
Pulse output rating	475	950	pulses/m^3	pulses/ft^3
Specifies the scaling of the pulse frequency from the flow rate.				
Pulse/AO update rate	476	952	sec	sec
Specifies how often the pulse output and analog output will be updated.				
Modbus averager update rate	477	954	sec	sec
Specifies how often Modbus registers will be updated.				
Slot 1 IO Type	478	956	-	-
Selects the type of module in the slot. 0=4-20mA input for Temperature. 1=4-20mA input for Pressure. 4=4-20mA output for flow rate. 5=4-20mA output for flow rate at standard conditions. 10=No module installed.				
Slot 1 Max value	479	958	-	-
Maximum value of physical value being measured/output				
Slot 1 Min value	480	960	-	-
Minimum value of physical value being measured/output				
Slot 1 calibration factor A	481	962	-	-
Calibration factor applied to the normalised converter count value				
Slot 1 calibration factor B	482	964	-	-
Calibration factor applied to the normalised converter count value				
Slot 1 calibration factor CAL1	483	966	-	-
Calibration factor of the module (printed on the module).				
Slot 1 calibration factor CAL2	484	968	-	-
Calibration factor of the module (printed on the module).				
Slot 2 IO Type	485	970	-	-
Selects the type of module in the slot. 0=4-20mA input for Temperature. 1=4-20mA input for Pressure. 4=4-20mA output for flow rate. 5=4-20mA output for flow rate at standard conditions. 10=No module installed.				
Slot 2 Max value	486	972	-	-
Maximum value of physical value being measured/output				
Slot 2 Min value	487	974	-	-
Minimum value of physical value being measured/output				
Slot 2 calibration factor A	488	976	-	-
Calibration factor applied to the normalised converter count value				
Slot 2 calibration factor B	489	978	-	-
Calibration factor applied to the normalised converter count value				
Slot 2 calibration factor CAL1	490	980	-	-
Calibration factor of the module (printed on the module).				

Description	Obj.	Modb.	Unit SI	Unit US
Slot 2 calibration factor CAL2	491	982	-	-
Calibration factor of the module (printed on the module).				
Com1 Duplex mode	492	984		
Selects full or half duplex. Half duplex is used on RS485, two wires (Tx and Rx are send on the same pair).				
Com2 Modbus node number	493	986	-	-
Modbus node number for multidrop networks. Use node number 1 for 1-to-1 connections				
Com2 Baudrate	494	988	-	-
Communication speed. Meter and client (PC) needs to use the same baudrate.				
Com2 Duplex mode	495	990		
Selects full or half duplex. Half duplex is used on RS485, two wires (Tx and Rx are send on the same pair).				

Misc.

Description	Obj.	Modb.	Unit SI	Unit US
Transducer X-ref	463	926	-	-
Debug Mode	467	934		
Select the usage of the debug buffer.¨				
Lateral position 1	468	936	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				
Lateral position 2	469	938	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				
Lateral position 3	470	940	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				
Lateral position 4	471	942	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				
Lateral position 5	472	944	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				
Lateral position 6	473	946	-	-
Lateral level of each path. Defined in radius, zero is center, -1 is bottom, 1 is top. If all are set to zero, default values will be used.				

FallbackValues

Description	Obj.	Modb.	Unit SI	Unit US
Fallback value - Line Pressure	660	1320	bara	psiA
Fallback value for pressure. Used if fallback is selected in the Line Pressure Selector (406), or value is not updated on Modbus or Analog module.				
Fallback value - Line Temperature	661	1322	°C	F
Fallback value for pressure. Used if fallback is selected in the Line Temperature Selector (407), or value is not updated on Modbus or Analog module.				
Fallback value - Gas Density at Line Conditions	662	1324	kg/m³	lbs/ft³
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Gas Density at Ref. Conditions	663	1326	kg/Sm³	lbs/Sft³
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Gas Compressibility at Line Cond.	664	1328	-	-
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Gas Compressibility at Ref. Cond.	665	1330	-	-
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Methane (C1)	666	1332	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Nitrogen (N2)	667	1334	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Carbon dioxide (CO2)	668	1336	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Ethane (C2)	669	1338	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Propane (C3)	670	1340	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Water (H2O)	671	1342	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Hydrogen sulphide (H2S)	672	1344	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Hydrogen (H2)	673	1346	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Carbon oxide (CO)	674	1348	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Oxygen (O2)	675	1350	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole i-Butane (IC4)	676	1352	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole n-Butane (NC4)	677	1354	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				

Description	Obj.	Modb.	Unit SI	Unit US
Fallback value - Mole i-Pentane (IC5)	678	1356	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole n-Pentane (NC5)	679	1358	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole n-Hexane (NC6)	680	1360	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole n-Heptane (NC7)	681	1362	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole n-Octane (NC8)	682	1364	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole n-Nonane (NC9)	683	1366	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole n-Decane (NC10)	684	1368	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Helium (HE)	685	1370	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Argon (AR)	686	1372	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole Hexane+ (C6+)	687	1374	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				
Fallback value - Mole rest	688	1376	mol %	% mol
Fallback value is used if selector is fallback or external source fail to update value.				

Transducer Calibration node 1

Description	Obj.	Modb.	Unit SI	Unit US
Node 1 Pressure	500	1000	bara	psiA
Identifies the pressure for this node during transducer calibration.				
Node 1 Temperature	501	1002	°C	F
Identifies the temperature for this node during transducer calibration.				
Node 1 Signal Type	502	1004	-	-
Identifies the signal type for this node during transducer calibration.				
Node 1 Tr. Delay 1	503	1006	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 1 Tr. Delay 2	504	1008	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 1 Tr. Delay 3	505	1010	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 1 Tr. Delay 4	506	1012	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 1 Tr. Delay 5	507	1014	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 1 Tr. Delay 6	508	1016	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				

Transducer Calibration node 2

Description	Obj.	Modb.	Unit SI	Unit US
Node 2 Pressure	509	1018	bara	psiA
Identifies the pressure for this node during transducer calibration.				
Node 2 Temperature	510	1020	°C	F
Identifies the temperature for this node during transducer calibration.				
Node 2 Signal Type	511	1022	-	-
Identifies the signal type for this node during transducer calibration.				
Node 2 Tr. Delay 1	512	1024	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 2 Tr. Delay 2	513	1026	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 2 Tr. Delay 3	514	1028	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 2 Tr. Delay 4	515	1030	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 2 Tr. Delay 5	516	1032	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 2 Tr. Delay 6	517	1034	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				

Transducer Calibration node 3

Description	Obj.	Modb.	Unit SI	Unit US
Node 3 Pressure	518	1036	bara	psiA
Identifies the pressure for this node during transducer calibration.				
Node 3 Temperature	519	1038	°C	F
Identifies the temperature for this node during transducer calibration.				
Node 3 Signal Type	520	1040	-	-
Identifies the signal type for this node during transducer calibration.				
Node 3 Tr. Delay 1	521	1042	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 3 Tr. Delay 2	522	1044	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 3 Tr. Delay 3	523	1046	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 3 Tr. Delay 4	524	1048	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 3 Tr. Delay 5	525	1050	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				
Node 3 Tr. Delay 6	526	1052	us	us
Identifies the transducer delay for each pair of transducers for this node during transducer calibration.				

Measured values

Description	Obj.	Modb.	Unit SI	Unit US
Log Count	0	0	-	-
This counter is incremented by one each time the meter has calculated a new flow rate. Rolls over at 65536.				
Alarm Status	1	2	-	-
The alarm status is a bit coded value. Each alarm has a value, and the values are added. 1=Too high flow 2=Electronics failure 4=Tranducer failure 8=Calculation error 16=Signal % low 32=Gain error 64=VOS difference 128=Path substitution 256Parameter error 512=S/N ratio low 1024=Turbulence level high 2048=Profile deviation high				
Flow Velocity	2	4	m/s	ft/sec
Measured flow velocity through meter (Integrated across all paths)				
Velocity of Sound	3	6	m/s	ft/sec
Measured velocity of sound. (Average for all paths)				
Actual Volum Flowrate	4	8	m^3/h	ft^3/h
Measured volume flowrate.				
Accumulated Volume Forward	5	10	m^3	ft^3
Accumulated volume in forward flow direction. Rolls over at 1000000000 (1E9) m3. Always accumulating in forward flow.				
Accumulated Volume Reverse	6	12	m^3	ft^3
Accumulated volume in reverse flow direction. Rolls over at 1000000000 (1E9) m3. Always accumulating in reverse flow.				
Profile flatness (Center/Outer Paths)	7	14	%	%
Amount of flow on the outer paths compared to the center paths				
Profile symetry (Upper/Lower Paths)	8	16	%	%
Amount of flow on the top paths compared to the bottom paths				
Swirl flow	9	18	%	%
Amount of flow rotation (clockwise)				
Cross flow	10	20	%	%
Amounbt of dual vortex rotation				
Increment Time Duration	11	22	sec	sec
Time elapsed since last update of MODBUS registers. (See also object 10.)				
Used Line Pressure	12	24	bara	psiA
Line pressure (at meter) used in caculation for correction of: 1.Dimensions (ID, angle, path lengths) 2.Selection of transducer calibration node 3.Correction of zero calibration data. Source (Analog/Modbus/Fallback) is selected by object 706.				

Description	Obj.	Modb.	Unit SI	Unit US
Used Line Temperature	13	26	°C	F
Line temperature (at meter) used in caculation for correction of: 1.Dimensions (ID, angle, path lengths) 2.Selection of transducer calibration node 3.Correction of zero calibration data. Source (Analog/Modbus/Fallback) is selected by object 707.				
Measured Flow Velocity 1	14	28	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Flow Velocity 2	15	30	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Flow Velocity 3	16	32	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Flow Velocity 4	17	34	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Flow Velocity 5	18	36	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Flow Velocity 6	19	38	m/s	ft/sec
Flow velocity measured along each single path.				
Measured Velocity of Sound 1	20	40	m/s	ft/sec
Velocity of sound measured along each single path.				
Measured Velocity of Sound 2	21	42	m/s	ft/sec
Velocity of sound measured along each single path.				
Measured Velocity of Sound 3	22	44	m/s	ft/sec
Velocity of sound measured along each single path.				
Measured Velocity of Sound 4	23	46	m/s	ft/sec
Velocity of sound measured along each single path.				
Measured Velocity of Sound 5	24	48	m/s	ft/sec
Velocity of sound measured along each single path.				
Measured Velocity of Sound 6	25	50	m/s	ft/sec
Velocity of sound measured along each single path.				
Signals pr. path pr. calculation.	98	196	-	-
Number of signals on each path used to calculate the flow rate update for the pulse out.				

Signal Measurements

Description	Obj.	Modb.	Unit SI	Unit US
Signal Percentage 1A	26	52	%	%
How many of the received signals are used for calculation.				
Signal Percentage 1B	27	54	%	%
How many of the received signals are used for calculation.				
Signal Percentage 2A	28	56	%	%
How many of the received signals are used for calculation.				
Signal Percentage 2B	29	58	%	%
How many of the received signals are used for calculation.				
Signal Percentage 3A	30	60	%	%
How many of the received signals are used for calculation.				
Signal Percentage 3B	31	62	%	%
How many of the received signals are used for calculation.				
Signal Percentage 4A	32	64	%	%
How many of the received signals are used for calculation.				
Signal Percentage 4B	33	66	%	%
How many of the received signals are used for calculation.				
Signal Percentage 5A	34	68	%	%
How many of the received signals are used for calculation.				
Signal Percentage 5B	35	70	%	%
How many of the received signals are used for calculation.				
Signal Percentage 6A	36	72	%	%
How many of the received signals are used for calculation.				
Signal Percentage 6B	37	74	%	%
How many of the received signals are used for calculation.				
Gain 1A	38	76	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 1B	39	78	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 2A	40	80	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 2B	41	82	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 3A	42	84	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 3B	43	86	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 4A	44	88	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 4B	45	90	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				

Description	Obj.	Modb.	Unit SI	Unit US
Gain 5A	46	92	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 5B	47	94	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 6A	48	96	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				
Gain 6B	49	98	-	-
The amplification of the received signal. Logaritmic scale, 200 = double/half. Range 100-2600				

Travel times

Description	Obj.	Modb.	Unit SI	Unit US
Raw transit time A 1	68	136	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time A 2	69	138	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time A 3	70	140	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time A 4	71	142	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time A 5	72	144	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time A 6	73	146	nS	nS
The measured transit time firing downstream (positive flow) on each path. Transit time is not corrected for transducer calibration.				
Raw transit time Diff B-A 1	74	148	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				
Raw transit time Diff B-A 2	75	150	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				
Raw transit time Diff B-A 3	76	152	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				
Raw transit time Diff B-A 4	77	154	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				
Raw transit time Diff B-A 5	78	156	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				
Raw transit time Diff B-A 6	79	158	nS	nS
Difference in transit time between upstream and downstream. Positive number means positive flow.				

Profile

Description	Obj.	Modb.	Unit SI	Unit US
Uncorrected flow velocity 1	80	160	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected flow velocity 2	81	162	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected flow velocity 3	82	164	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected flow velocity 4	83	166	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected flow velocity 5	84	168	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected flow velocity 6	85	170	m/s	ft/sec
Same as object 14-19, but not correted for path substitution.				
Uncorrected velocity of sound 1	86	172	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Uncorrected velocity of sound 2	87	174	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Uncorrected velocity of sound 3	88	176	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Uncorrected velocity of sound 4	89	178	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Uncorrected velocity of sound 5	90	180	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Uncorrected velocity of sound 6	91	182	m/s	ft/sec
Same as object 20-25, but not correted for path substitution.				
Velocity profile factor 1	92	184	-	-
Reference flow profile used for check and correction/substitution of path velocity and VOS.				
Velocity profile factor 2	93	186	-	-
Reference flow profile used for check and correction/substitution of path velocity and VOS.				
Velocity profile factor 3	94	188	-	-
Reference flow profile used for check and correction/substitution of path velocity and VOS.				
Velocity profile factor 4	95	190	-	-
Reference flow profile used for check and correction/substitution of path velocity and VOS.				
Velocity profile factor 5	96	192	-	-
Reference flow profile used for check and correction/substitution of path velocity and VOS.				
Velocity profile factor 6	97	194	-	-
Reference flow profile used for check and correction/substitution of path velocity and VOS.				
Travel time correction count 1	204	408		
Indicates how many times the travel time on that specific path have been substituted.				
Travel time correction count 2	205	410		
Indicates how many times the travel time on that specific path have been substituted.				

Description	Obj.	Modb.	Unit SI	Unit US
Travel time correction count 3	206	412		
Indicates how many times the travel time on that specific path have been substituted.				
Travel time correction count 4	207	414		
Indicates how many times the travel time on that specific path have been substituted.				
Travel time correction count 5	208	416		
Indicates how many times the travel time on that specific path have been substituted.				
Travel time correction count 6	209	418		
Indicates how many times the travel time on that specific path have been substituted.				

S/N measuremets

Description	Obj.	Modb.	Unit SI	Unit US
S/N ratio raw signal 1	50	100	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio raw signal 2	51	102	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio raw signal 3	52	104	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio raw signal 4	53	106	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio raw signal 5	54	108	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio raw signal 6	55	110	dB	dB
Measured ratio between the raw noise and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 1	56	112	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 2	57	114	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 3	58	116	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 4	59	118	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 5	60	120	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
S/N ratio used signal 6	61	122	dB	dB
Measured ratio between the noise (after signal processing) and the used signal in dB. Each 6dB means half the amplitude.				
Turbulence level 1	62	124	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				
Turbulence level 2	63	126	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				
Turbulence level 3	64	128	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				

Description	Obj.	Modb.	Unit SI	Unit US
Turbulence level 4	65	130	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				
Turbulence level 5	66	132	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				
Turbulence level 6	67	134	%	%
Level of path velocity turbulence calculated as standard deviation of last 10 seconds.				

Standard calculations

Description	Obj.	Modb.	Unit SI	Unit US
Mass flowrate	100	200	kg/h	lbs/h
Mass flow rate calculated using Used Gas Density (104)				
Standard volume flowrate	102	204	Sm^3/h	Sft^3/h
Volume flow rate calculated back to standard conditions using: Line Pressure (12), Line Temperature (13) and Line Compressibility (106)				
Used Gas Density at Line Conditions	104	208	kg/m^3	lbs/ft^3
Gas Density (at meter conditions) used in caculation of mass flow rate / increment Source (Fallback/Modbus/Calculated) is selected by object 708.				
Used Gas Density at Ref. Conditions	105	210	kg/Sm^3	lbs/Sft^3
Gas Density (at ref. conditions) Source (Fallback/Modbus/Calculated) is selected by object 708.				
Used Gas Compressibility at Line Cond.	106	212	-	-
Gas Compressibility (at meter conditions) used in caculation of standard flow rate / increment Source (Fallback/Modbus/Calculated) is selected by object 709.				
Used Gas Compressibility at Ref. Cond.	107	214	-	-
Gas Compressibility (at ref. conditions) Source (Fallback/Modbus/Calculated) is selected by object 709.				

IO values

Description	Obj.	Modb.	Unit SI	Unit US
Pulse out requested frequency	110	220	Hz	Hz
Current frequency generated on the pulse output.				
Time stamp	111	222	sec	sec
Time stamp of last frequency change				
Pulse out total count forward	112	224	-	-
Internal pulse counter inside the AVR processor. If this is moving, the AVR is running				
Pulse In 1 Count	113	226	-	-
Received number of pulses on the digital input 1				
Pulse In 2 Count	114	228	-	-
Received number of pulses on the digital input 2				
Freq In 1	115	230	-	-
Current frequency on digital input 1				
Freq In 2	116	232	-	-

Description	Obj.	Modb.	Unit SI	Unit US
Current frequency on digital input 2				
Slot 1 Count value	120	240	-	-
The digital value read/sent to the analog module				
Slot 2 Count value	121	242	-	-
The digital value read/sent to the analog module				
Analog Temperature Input	122	244	°C	F
Temperature value read from temperature transmitter. The selector object (707) needs to be set to analog to use this value				
Analog Pressure Input	123	246	bara	psiA
Pressure value read from pressure transmitter. The selector object (706) needs to be set to analog to use this value				
Line pressure, Modbus	130	260	bara	psiA
Temperature value received from modbus link. The selector object (707) needs to be set to modbus to use this value				
Line temperature, Modbus	131	262	°C	F
Pressure value received from modbus link. The selector object (706) needs to be set to modbus to use this value				
Gas density, Line Cond. , Modbus	132	264	kg/m^3	lbs/ft^3
Line Density value received from modbus link. The selector object (708) needs to be set to modbus to use this value				
Gas density, Ref. Cond. , Modbus	133	266	kg/Sm^3	lbs/Sft^3
Ref. Density value received from modbus link. The selector object (708) needs to be set to modbus to use this value				
Gas Compressibility, Line Cond. , Modbus	134	268	-	-
Line Compressibility value received from modbus link. The selector object (709) needs to be set to modbus to use this value				
Gas Compressibility, Ref. Cond. , Modbus	135	270	-	-
Ref. Compressibility value received from modbus link. The selector object (709) needs to be set to modbus to use this value				

Density calculations

Description	Obj.	Modb.	Unit SI	Unit US
Calculated Velocity of Sound	170	340	m/s	ft/sec
Velocity of sound calculated by DECA using Pressure, Temperature and gas composition.				
Calculated average Mole Weight	171	342	kg/mol	lbs/mol
Mol Weight calculated by DECA using Pressure, Temperature and gas composition.				
Calculated DZ/DP	172	344	1/Pa	1/Pa
DZ/DP calculated by DECA using Pressure, Temperature and gas composition.				
Calculated DZ/DT	173	346	1/K	1/K
DZ/DT calculated by DECA using Pressure, Temperature and gas composition.				
Calculated Isobaric Heat Capacity	174	348	J/kmol	J/kmol
Isobaric Heat Capacity calculated by DECA using Pressure, Temperature and gas composition.				
Calculated gas compressibility,line	175	350	-	-
Line compressibillity calculated by AGA8 using Pressure, Temperature and gas composition.				
Calculated Gas Density, line	176	352	kg/m³	lbs/ft³
Line density calculated by AGA8 using Pressure, Temperature and gas composition.				
Mole Methane (C1)	180	360	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole Nitrogen (N2)	181	362	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole Carbn dioxide (CO2)	182	364	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole Ethane (C2)	183	366	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole Propane (C3)	184	368	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole Water (H2O)	185	370	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole Hydrogen sulphide (H2S)	186	372	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole Hydrogen (H2)	187	374	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole Carbon oxide (CO)	188	376	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole Oxygen (O2)	189	378	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole i-Butane (IC4)	190	380	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole n-Butane (NC4)	191	382	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole i-Pentane (IC5)	192	384	mol %	% mol
Gas composition calculated by DECA B or C.				

Description	Obj.	Modb.	Unit SI	Unit US
Mole n-Pentane (NC5)	193	386	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole n-Hexane (NC6)	194	388	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole n-Heptane (NC7)	195	390	mol %	% mol
Gas composition calculated by DECA B or C.				
Mole n-Octane (NC8)	196	392	mol %	% mol
Gas composition calculated by DECA B or C.				

Status / Errors

Description	Obj.	Modb.	Unit SI	Unit US
Log Count	200	400	-	-
This counter is incremented by one each time the meter has calculated a new flow rate. Rolls over at 65536.				
Alarm Status	201	402		
The alarm status is a bit coded value. Each alarm has a value, and the values are added. 1=Too high flow 2=Electronics failure 4=Tranducer failure 8=Calculation error 16=Signal % low 32=Gain error 64=VOS difference 128=Path substitution 256Parameter error 512=S/N ratio low 1024=Turbulence level high 2048=Profile deviation high				
Currently used transducer calibration node	202	404		
Transducer calibration node is selected based on used temerature and pressure.				
Profile Learner State	203	406		
Indicates the current status for recording of the current profile. 0=Learning 1=Flow velocity outside learning range (No learning). 2=Unstable flow profile (No learning) 3=Low quality of measurements (No learning).				
Too low flow	216	432		
This alarm is set when the flow velocity is higher than the alarm limit set in object 433. 0=OK 1=Alarm				
Too high flow	217	434		
This alarm is set when the flow velocity is higher than the alarm limit set in object 434. 0=OK 1=Alarm				
Electronics failure	218	436		
This alarm is set when the electronics have detectable internal probem i.e. interprocessor communication. Bit code: 1=Pulse module error				
Transducer Failure	219	438		
When the signal % is low or gain is high, the transducer failure alarm is set. Bit code: 1=1A 2=1B 4=2A 8=2B 16=3A 32=3B 64=4A 128=4B 256=5A 512=5B 1024=6A 2048=6B				

Description	Obj.	Modb.	Unit SI	Unit US
Calculation error	220	440		
This alarm is set when it is impossible to calculate a flow. Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
Signal % low	221	442		
This alarm is set when the signal % is lower than the alarm limit set in object 435 Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
Gain High	222	444		
This alarm is set when the gain is higher than the alarm limit set in object 436 Bit code: 1=1A 2=1B 4=2A 8=2B 16=3A 32=3B 64=4A 128=4B 256=5A 512=5B 1024=6A 2048=6B				
Gain deviation	223	446		
This alarm is set when the gain of the path differs more from the median than the alarm limit set in object 437 Bit code: 1=1A 2=1B 4=2A 8=2B 16=3A 32=3B 64=4A 128=4B 256=5A 512=5B 1024=6A 2048=6B				
VOS Difference	224	448		
This alarm is set when the VOS of the path differs more from the median than the alarm limit set in object 438 Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
Path substitution indication	225	450		
This alarm is set if the path velocity and VOS is substituted because of wrong measurement. Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
S/N ratio low	226	452		
This alarm is set when the S/N level of the used (processed) signal is lower than the alarm limit set in object 439. Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
Turbulence level high	227	454		
This alarm is set when the turbulence level of the path is higher than the alarm limit set in object 440. Bit code: 1=Path 1, 2=Path 2, 4=Path 3, 8=Path 4, 16=Path 5, 32=Path 6				
Flow profile deviation	228	456		
This alarm is set when the flow profile differes more from the reference profile than the alarm limit set in object 441-443 Bit code: 1=Profile Flatness Alarm, 2=Profile Symetry alarm, 4=Swirl flow alarm, 8=Cross flow alarm				

Hi-res Accumulators

Description	Obj.	Modb.	Unit SI	Unit US
Accumulated volume forward (m3)	230	460		
Non-resetable Accumulator for forward flow. (Integer part)				
Accumulated volume forward (m3*1E-9)	231	462		
Non-resetable Accumulator for forward flow. (Fraction part)				
Accumulated volume reverse (m3)	232	464		
Non-resetable Accumulator for reverse flow. (Integer part)				
Accumulated volume reverse (m3*1E-9)	233	466		
Non-resetable Accumulator for reverse flow. (Fraction part)				
Accumulated error volume forward (m3)	234	468		
Non-resetable Accumulators. Only accumulating when there is an active alarm				
Accumulated error volume forward (m3*1E-9)	235	470		
Non-resetable Accumulators. Only accumulating when there is an active alarm				
Accumulated error volume reverse (m3)	236	472		
Non-resetable Accumulators. Only accumulating when there is an active alarm				
Accumulated error volume reverse (m3*1E-9)	237	474		
Non-resetable Accumulators. Only accumulating when there is an active alarm				

External input

Description	Obj.	Modb.	Unit SI	Unit US
External update of Line Pressure	1000	2000	bara	psiA
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value. Note that register 10000-10028 is containg the same set of registers as 1000-1028 (for backward compatability).				
External update of Line Temperature	1001	2002	°C	F
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Gas Density at Line Conditions	1002	2004	kg/m³	lbs/ft³
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Gas Density at Ref. Conditions	1003	2006	kg/Sm³	lbs/Sft³
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Gas Compressibility at Line Cond.	1004	2008	-	-
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Gas Compressibility at Ref. Cond.	1005	2010	-	-
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Methane (C1)	1006	2012	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Nitrogen (N2)	1007	2014	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Carbon dioxide (CO2)	1008	2016	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Ethane (C2)	1009	2018	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Propane (C3)	1010	2020	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Water (H2O)	1011	2022	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Hydrogen sulphide (H2S)	1012	2024	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Hydrogen (H2)	1013	2026	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Carbon oxide (CO)	1014	2028	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Oxygen (O2)	1015	2030	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole i-Butane (IC4)	1016	2032	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole n-Butane (NC4)	1017	2034	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				

Description	Obj.	Modb.	Unit SI	Unit US
External update of Mole i-Pentane (IC5)	1018	2036	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole n-Pentane (NC5)	1019	2038	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole n-Hexane (NC6)	1020	2040	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole n-Heptane (NC7)	1021	2042	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole n-Octane (NC8)	1022	2044	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole n-Nonane (NC9)	1023	2046	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole n-Decane (NC10)	1024	2048	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Helium (HE)	1025	2050	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Argon (AR)	1026	2052	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole Hexane+ (C6+)	1027	2054	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
External update of Mole rest	1028	2056	mol %	% mol
Write only register from modbus for continous update of this value. Set the selector to Modbus to use this value.				
Additional external update value	1030	2060	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1031	2062	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1032	2064	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1033	2066	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1034	2068	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1035	2070	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1036	2072	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1037	2074	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1038	2076	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1039	2078	-	-
General purpose read/write registers that is not used by the meter itself				

Description	Obj.	Modb.	Unit SI	Unit US
Additional external update value	1040	2080	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1041	2082	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1042	2084	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1043	2086	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1044	2088	-	-
General purpose read/write registers that is not used by the meter itself				
Additional external update value	1045	2090	-	-
General purpose read/write registers that is not used by the meter itself				

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